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INDUSTRIAL DEVELOPMENT ORGANIZATION

Workshop on Maintenance and Plant
Inspection in Petroleum Refineries

Vienna, Austria, 5 - 23 November 1984*

REPORT**

* Organized by United Nations Industrial Development Organization (UNIDO) in co-operation with the Government of Austria, the OPEC Fund for International Development and OMV Aktiengesellschaft.

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1. Introduction

In previous years UNIDO, in co-operation with the Austrian Government, the state-owned petroleum enterprise Osterreichische Mineralöl Verwaltung (OMV), and the OPEC Fund for International Development, has organized three workshops on petroleum refining industries in Vienna, Austria:

(i) Workshop on Petroleum Processing, 21 - 30 April 1981
(ii) Workshop on Production Planning and Energy Management in Petroleum Refineries, 3 - 19 May 1982
(iii) Workshop on Maintenance and Plant Inspection in Petroleum Refineries, 5 - 23 September 1983

In continuation the fourth workshop of the series was organized on "Maintenance and Plant Inspection in Petroleum Refineries from 5 - 23 November 1984 in Vienna, Austria.

2. The Workshop

As on previous occasions, the technical programme of this year's workshop was conducted by OMV at their refinery in Schwechat/Vienna, and included lectures, discussions and plant visits.

The Workshop provided a good opportunity for refinery managers, engineers and technicians from developing countries to exchange experience and information on the above mentioned topics among themselves and with OMV. They were able to examine techniques and methods applied successfully by OMV and to identify possible co-operation in this field.

The topic of the workshop organized in 1983 was of particular importance to petroleum refiners in developing countries as many of them suffer from old plant installations and consequently from inefficient performance. It is in this area that refineries in developing countries need more assistance since not only good material but also skilled and experienced workmanship is required to raise the efficiency of a refinery.

For the above reasons, the theme of maintenance and plant inspection was repeated in this year's workshop. As part of this workshop a meeting of an experience exchange group was conducted dealing with practical problems related to maintenance and plant inspection in petroleum refineries.

The workshop, comprising the meeting of the experience exchange group, had the following purposes:

- to exchange experience and information in maintenance and plant inspection of petroleum refineries for the improvement of the capabilities of refinery personnel from developing countries and to establish means for co-operation among themselves and with OMV in that field;

- to review well proven and new methods in the field of maintenance/inspection of petroleum refineries and assess their applicability in developing countries;

- to discuss possible solutions for selected maintenance/inspection problems brought up by the participants.

2.1 Programme and Summary of Lectures

5 November

Opening Session at UNIDO

Monitoring Session at OMV Refinery, Schwechat

Visit of the refinery

6 and 7 November

Maintenance in Refineries - An Overview (J. Maier)

The rationalization measures taken in recent years within the processing industries have led to the construction of an increased number of units/ plants in the production sector, resulting in a decrease of the production costs. At the same time, however, the cost of maintenance - a labour-intensive sector - has considerably increased. Therefore efforts are being directed towards minimizing the costs of maintenance to the lowest economically and technically acceptable level. This implies careful design of maintenance strategies and their implementation.

The management of a refinery has therefore to plan and establish appropriate maintenance policies. Modern maintenance requires interaction between many different working groups of a refinery and cannot be left with the maintenance department alone, which, together with the staff of the production plants, will carry out the required maintenance function as defined in an overall refinery maintenance policy.

Maintenance Functions, Policy and Strategies (J. Maier)

Maintenance as a whole comprises all personnel and activities involved in the maintenance of a refinery. Maintenance policy is geared towards minimizing maintenance costs and generally would allow expenditures only in cases where the output contributes to the safety of personnel and plant equipment, to the refinery profitability and to the implementation of Government, community or labour organizations regulations. As a general principle the following guidelines may be observed: refinery-wide awareness and responsibility for maintenance expenditures; reasonable approach in terms of safety, profitability, environmental control, energy conservation; improvement of the skills of maintenance and other staff.

The day-to-day maintenance decisions may be guided by the following considerations:

- Break-down maintenance: A given system breaks down due to a part which has become completely useless and therefore needs either repair or replacement. The latter requires spare parts stockage causing storage costs.

- Preventive maintenance: Based on the estimated lifetime of parts, a scheme for planned exchange of parts can be developed. With larger plant systems this requires special index card systems for control and, from a certain size of the refinery on, the assistance of a computerized part control, exchange and supply system.

- Predictive maintenance: Since today various test methods are available to check the status of plant parts on stream, failure of equipment can be predicted within a certain uncertainty range and repair programmes, production and procurement schedules can be set up accordingly. These measures are

based on comparative analysis of cost of repair of defective part and production loss weighted against the consequences caused by total break-down envisaged for the defective part. Scientific methods combined with empirial data and practical experience will assist maintenance managers in the decision-making process.

- Corrective maintenance: In cases of high frequency of damages which may reveal a defect in the construction, a solution for the improvement of such a construction must be found.

Maintenance through External Contractors (J.Maier)

Many refineries have maintenance work done through outside contractors. The extent to which external contractors are assigned for this work depends largely on local conditions, the maintenance policy of the refinery and technical security regulations. The decision for an engagement of an outside contractor is usually guided by the following considerations: provision of know-how not available within the refinery; repair/overhaul of plants; periodic requests for maintenance works to be contracted and establishment of a contract on a permanent basis; high work peak loads within the refinery and lack of own personnel; requirement of very special technical devices and skills for certain maintenance works. Maintenance management must decide at an early stage whether work should be done through contractors or whether additional investment and recruitment of personnel is more appropriate for satisfying maintenance needs.

Shut-down Planning and Scheduling (J. Maier)

Very special methods are necessary for shut-down operations of a plant, which must be carried out at the shortest time possible. This is efficaciously done through network planning and network analysis (critical path planning method). This implies the preparation of a detailed work programme involving the plant manager, field technician, plant technician, the inspection department and the stop planner. Network plans are established and analyzed. Personnel is usually recruited through contracting firms. The shut-down programme is supervised and monitored preferably by the stop planner. A very important phase is the evaluation of data after work has been completed. These data represent a good basis for future planning.

8 November

Maintenance of Equipment - Compressors, Turbines (H. Miglitsch)

Plant equipment such as turbines and compressors need special attention in maintenance and service, whereby one has to distinguish between reciprocating compressors and turbine compressors and turbines. Organization of the responsibility for staff concerned with service and maintenance depends on the size of the refinery. Engineers and workers have to be trained almost on a continuous basis. OMV has made the experience that for turbines and compressors periodic service is not necessary but recommends regular protocols for controls of machine performance data. Through the variation of these data malfunctions can be identified. Reciprocating compressors, however, will require maintenance work at regular intervals as recommended by the manufacturer, mainly due to the higher wear rate of many parts of this type of compressor system. Several examples for maintenance work during a planned plant shut-down are given.

The degree of vibration of rotary machinery is a very strong indicator for imperfect alignment, instable bearings, unbalanced rotors, etc. These causes for malfunctions must be destroyed. Therefore the many different types of bearings must be checked as well as the rotors (pumps, fans, electric motor rotors, compressors, turbines), and the influence of the settling of the foundation and of temperature difference.

Some special instruments exist such as alignment calculator, bolt extensiometer, pressure test/repair facilities for compressor valves. Particularly the extensiometer appears to be very useful as it is a means to determine the precise length of a bolt (ultrasonic) and therefore provides the basis for accurate calculation of the bolt preload. It also can be used for checking relaxation and helps to prevent thermal cycling, vibration, gasket creep, load cycles and joint failures.

9, 12 and 13 November

Plant Inspection in Petroleum Refineries (O.P. Hornasek)

Plant inspection in general addresses the following issues: corrosion, lifetime of equipment and scheduling of inspection, inspection methods, deterioration/failure of equipment and its prevention, detailed equipment inspection, on-stream inspection and special test methods.

Corrosion problems: In oil refineries mild steel is the material most commonly used and it suffers from corrosion at various degrees caused by a variety of sources. It is necessary to determine the nature and mechanism of corrosion so that suitable and economical methods may be applied for its prevention. Various remedial actions are discussed such as coating/linings, addition of inhibitors, cathodic protection, and some causes for corrosion such as chloride stress corrosion cracking, polythionic acid stress corrosion cracking, sulfide stress cracking, uniform corrosion, acid corrosion, caustic corrosion, high temperature corrosion, are described.

Schedules for equipment inspection: Government regulation (e.g. Austrian pressure vessel law) determines the frequency required for inspection, in general not less than every three years, and for hydrotesting every six years. Only under very special circumstances can this schedule be modified, if Government authorities agree. Inspection work to be carried out is listed and recorded at the beginning of the calendar year by the inspection department, covering the work for vessels, piping, safety valves and leaking glands. Examples for inspection schedules are demonstrated.

Inspection methods: This part describes the methods to be applied for the preparation and execution of inspection work. The following points have to be borne in mind: local Government regulations, construction code requirements, inspection service for corrosive and non-corrosive equipment. General inspection may be carried out through visual inspection, hammer testing, gagings, followed by very special inspection methods as required. To determine the remaining lifetime of a given piece of equipment requires considerable experience. The decision on whether or whether not to withdraw equipment from service may be guided by two considerations: (i) the minimal allowable wall thickness, and (ii) lack of justification for economically acceptable repair.

Cleaning for inspection: Various methods exist for this purpose ranging from water/steam washing, manual cleaning, sand blasting, brushing, reaming, chipping, to chemical and thermal methods.

Metal loss measurements and calculations: The parameters which govern the lifetime of equipment are: minimum allowable thickness, remaining corrosion allowance, corrosion rate, remaining life. An example for estimation of actual lifetime is presented. The various methods for corrosion rate measurements are described and their application explained.

In addition, the means for pressure testing are presented and procedures and safety considerations are explained. A very important work within inspection is welding, which requires very skilled personnel. Different types of welding necessary for inspection in petroleum refineries are listed and briefly described.

Deterioration/failure of equipment: The major cause for equipment failure is due to mechanical failure and corrosive attack. A review is presented on effects on various material and equipment, caused by mechanical stress and corrosion and oxidation. In addition, material exposed to a very special environment, such as high sub-critical temperature, overheating and others, may change its surface characteristics which may lead to dangerous conditions. Furthermore, the basic principles of cathodic protection are described and the different applications are outlined.

Lifetime of equipment: Very careful thought must be given to the judgement of lifetime to be expected for equipment. Premature retirement of equipment can waste money, while overdue utilization may cause failure with fatal consequences. Establishing the lifetime to be expected for a platforming heater is presented in detail as an example. Furthermore, an example for calculating remaining lifetime based on original and actual wall thickness is carried out (determination of remaining corrosion allowance and remaining life).

Detailed equipment inspection: Guidelines to be observed when a full inspection for any piece of equipment is called for, are laid down. Importance is attached to safety precaution and to the general safe limits of equipment. This is followed by a detailed description of a complete inspection, including nomenclature, design and retirement criteria, construction materials and repair and testing of the following equipment pieces: columns, pressure vessels, storage tanks, heat exchanger and cooling towers, process furnaces and boilers, pumps, turbines, compressors and machinery, instruments, piping and fittings, joints, bulk transmission lines, structures, fire proofing, insulations and foundations, and services.

On-stream inspection and special testing methods: The inspection of equipment in operation requires non-destructive testing methods (NDT-methods). However, many details cannot be detected while the unit is on-stream. The types and basic requirements of methods for on-stream inspection are described, which include visual inspection, ultrasonic, radiation tracer and infrared techniques as well as thermometric methods, radiation pyrometer method and acoustic emission methods. Examples are given on NDT acoustic inspection on pressure vessels and storage tanks and results are discussed.

10 and 11 November 1984 Saturday/Sunday

14 November

Material Management (G. Brantner, V. Klima)

Material management comprises the management of the warehouse, material handling and administration. An efficient material management can greatly reduce the shut-down time of a plant. Therefore security for material supply has high priority.

At OMV, 50% of the stored spare parts are permanently on stock, also for cases of unforeseen events. This long range planning requires capital cost. Efforts are therefore directed towards reducing these costs through improving warehouse administration. Storage of materials classified into material groups helps to locate material (sequential system) easily but requires a considerable amount of space. A new storage system was developed following the findings that 80% of stored parts are smaller than 950 x 200 x 350 mm. A computer-aided storage information system was created for locating parts. The new storage system needs only half the space of the old one. In addition, a computer programme is being developed to support material administration taking into account catalogue and technical information, purchasing, warehousing and accounting.

Material Supply - Spare Parts Information Flow and Purchase (H. Kreisler)

Being a relatively large refinery and involved in exploration, pipeline transport, engineering and construction, OMV has decided on a centralized purchase department. The material catalogue comprises 60,000 items. The material administrator revises this catalogue and the warehouse stocks according to actual requirements from the refinery. A selective control system has been developed which takes into account spare parts needed with higher frequency than others. Most of the materials are ordered from Austrian companies, USA and European companies with an average delivery time of 10 weeks, whereby four weeks are needed to comply with administrative regulations within the organization.

Maintenance of Process Pumps (H. Bieh)

An important cost factor represents the maintenance of process pumps. Pumps repair costs are approximately 7% of the total maintenance expenditures of a refinery. Most of the pump failures originate from defects in the mechanical seals (70%), bearings and oil seals, corrosion, erosion, cavitation, etc. OMV has developed a number of proceedings to reduce these cost factors.

Maintenance of Instrumentation - Pneumatic, Electronic Instruments (H. Kloyber)

For the control of approximately 6000 process variables, 3200 alarms and others, OMV refinery attaches importance to proper functioning of the respective control instruments. The types of instruments used - pneumatic, analog and digital electronic, microprocessor-based electronic - are all maintained by specially skilled technicians. Work is scheduled and organized for shut-down periods and for operation periods. There exists an experience exchange group on instrumentation which meets annually for two days presenting a catalogue of questions/problems for discussions.

Maintenance of Process Analysis Instruments (H. Kloyber)

Due to the relatively large number of analyzers (625) to be controlled, the process analyzer department of OMV has been divided into four groups: pH group (conductivity, pH, oil in water); O_2 group (O_2, viscosity, CO, CO_2, CPA, sulfur, pour point, IR, H_2S, boiling point, opacity); gas detection group (hydrocarbons, H_2S, portable gas detectors); process chromatograph group (GC, moisture analyzer), These instruments must be controlled exactly according to their maintenance manuals. Calibration of these instruments is an important task and must follow standardized sampling and analysis methods.

15 November

On-stream inspection and special testing methods: The inspection of equipment in operation requires non-destructive testing methods (NDT-methods). However, many details cannot be detected while the unit is on-stream. The types and basic requirements of methods for on-stream inspection are described, which include visual inspection, ultrasonic, radiation tracer and infrared techniques as well as thermometric methods, radiation pyrometer method and acoustic emission methods. Examples are given on NDT acoustic inspection on pressure vessels and storage tanks and results are discussed.

Material Standards (Raaber, B. Wischin from TUV, Austria)

In general various types of materials are used as construction material for the equipment in a refinery depending on the type and the strength of stress to which it is exposed: for temperatures up to 400°C carbon and low alloy steel, for high temperatures chromium steel, austenitic steel, for high pressure in presence of hydrogen chromium steel, and others. The Austrian legislation on pressure vessels defines the standards under which quality systems certificates can be granted for certain products operating under pressure. In addition, inspection of these units must be done in the presence of TUV (Technical Inspection and Control Authority). Only with their certificate the tested unit can be put into operation.

Trouble Shooting (H. Miglitsch)

Trouble shooting and predictive maintenance are closely linked. Today's machinery, e.g., turbo-machinery is technically getting more and more sophisticated and better trouble shooting techniques have become essential. Some recommendations are given to avoid malfunctioning of turbo-compressors, turbines, reciprocating compressors and other rotating equipment, such as pumps, fans, gears units. For compressor and turbine units, permanent monitoring of the vibration is necessary since vibration is one of the most frequent causes of failure of such units.

Analytical Trouble Shooting (H. Huber)

Methods and techniques are presented for supporting decision making and prediction of critical situations. The four models of reasoning in daily routine work - namely to determine the reason for troubles, to choose the best measure, to recognize problems ahead of time, to split a complex situation into parts - can be optimized by rational techniques. Although the approach to decision making and problem solving as described is of general nature, its practical application to maintenance within a refinery will have an impact on the efficiency of such a refinery.

Recuperation of Flare Gas

Even at thorough, normal operation of refineries and petrochemical plants, combustible gases (flare gases and tail gases) are developed, which represent a considerable waste of energy. OMV has therefore developed an economic flare gas utilization process, whereby the flare gas is fed into the fuel gas system of the plant. Care must be taken to avoid air in the recuperation unit for well-known reasons. The operation of this plant is automatic to the greatest possible extent to keep the whole system economic. The plant presently installed at OMV has a nominal capacity of 5000 m^3/hour. The process has been patented.

Planning a Repair Shop (P. Kielhauser)

A detailed analysis shows that maintenance costs can be reduced by careful planning of repair shops for the refinery. The main questions to be answered are: What is the maintenance demand? How can this demand be met? Where should the repair shops be located? Will repair shops need extension? How to plan the internal organization? How to plan equipment storage? All planning steps have to undergo critical evaluation with a view to their impacts on economics.

Training of Maintenance Personnel (J. Schweng)

Maintenance work may be done by contractors or by own personnel. Most refineries follow a mixed system whereby services like cleaning, welding, etc. are done through contractor and long/short-term repair/ turnarounds by refinery personnel. Skilled personnel is usually provided through recruitment of specialists from other refineries or by on-the-job training of experienced workers from other industries. A very important source for skilled workers is established through an apprenticeship programme in Austria. Nearly 60,000 students start every year such an apprenticeship in various fields/trades, whereby the apprentice receives practical on-the-job training according to a well established and approved training schedule and theoretical training in a vocational school (dual system). After 3.5 years a certificate as a qualified worker is awarded. At OMV 60 new apprendiceships were started in 1983.

A large part of training of maintenance personnel is done during installation and start-up of new units when experienced workers from contractors, manufacturers, engineering companies work together with the own workshop personnel. This is the moment for acquiring know-how in trouble shooting and repair work.

New training methods such as audio-visual and video programmes are now available. In addition, interactive training systems and simulator systems can be applied which represent very powerful training techniques, especially for training in the operation and maintenance of highly sophisticated machinery and instrumentation.

16 November

Meeting at the Federal Economic Chamber of Austria and with various Austrian suppliers of refinery equipment.

17 and 18 November Saturday/Sunday

19 November

Visits to Austrian companies/plants

20 to 22 November

Experience Exchange Group

23 November

Visit to OPEC Fund for International Development.

Closing Session at UNIDO.

2.2 Opening Session (5 November 1984)

Opening speeches were delivered by:

- Mr. L.F. Biritz, Deputy Director
  Division of Industrial Operations, UNIDO
- Mr. H. Miltner, Counsellor
  Adviser to the Permanent Representative of Austria
- Dr. A. Ezzati, Director
  Project Appraisal, The OPEC Fund for International Development
- Dr. F. Cech, Director of Refinery
  OMV Aktiengesellschaft
- Dr. H. Lederleitner
  Austrian Federal Economic Chamber

2.3 Closing Session (23 November 1984)

The session was introduced by Mr. Maung, Senior Industrial Development Officer, UNIDO, followed by Mr. J. Maier of OMV who thanked the workshop organizers and participants. During the ensuing Mr. B. Holloway, a consultant financed by The OPEC Fund for International Development, pointed out the need for more preparation and selectivity for the experience exchange group.

2.4 The Experience Exchange Group

In addition to the programme organized by OMV a three-and-one-half-day programme was organized for the Experience Exchange Group in which discussions were led by the OPEC Fund consultant Mr. B. Holloway. Topics discussed included:

- maintenance and planning control;
- corrosion problems;
- energy conservation;
- future activities of the Experience Exchange Group.

Presentations were also made by technical personnel of Fluor Plant Services International, UK, Gesellschaft für Industrieanlagen-Planung (GIP), FRG,and OMV, Austria. Participants from developing countries also made presentations on their problems and experiences.

The proceedings of the Experience Exchange Group are attached as Annex II.

3. Resolution of the Participants

The participants to the Experience Exchange Group have unanimously agreed to the following resolution - namely that:

(i) The Experience Exchange Group should be continued as a permanent mechanism.

(ii) UNIDO should provide permanent technical and administrative support.

(iii) There should be a continuous exchange of information by participants through UNIDO.

(iv) There should be an annual meeting to discuss problems and exchange information. This should be in conjunction with a series of technical lectures at the refinery.

(v) Before the meeting UNIDO would call for proposals for topics to be discussed and for offers of papers, particularly case studies, to be presented by the participants at the meeting.

(vi) In addition to these papers there should be a contribution on the topic from a highly developed refinery.

(vii) Some visits to plant of special interest should be included.

(viii) UNIDO should provide the Chairman for the meeting.

(ix) It is considered desirable that there be continuity of representation.

(x) The meeting should take place in September each year unless to be held in a country in which this was not the most suitable time of the year.

ANNEX I

List of Participants from Developing Countries

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Proceedings of the Experience Exchange Group

Tuesday, 20 November

1. Topic: Maintenance Planning and Control

2. Introduction: The following participants had stated a special interest in this subject in the questionnaire:

- Mr. R.A.C. Perez (Cuba)
- Mr. T. Mulu (Ethiopia)
- Mr. H. Al-Shaban (Kuwait)
- Mr. N.J.R. Fernando (Sri Lanka)
- Mr. O.M. Allawandi (Sudan)
- Mr. A. Intiyanaravut (Thailand)
- Mr. A. Ertem (Turkey)
- Mr. S.R. Saeed (Yemen)

The participants from Turkey and Kuwait also included this subject in their technical report. Whilst OMV included this subject in their programme it was considered so important that further specialized outside presentations were included and the participants discussed the implementation of modern techniques appropriate to their situations.

3. Proceedings:

3.1. Following introductory remarks by Dr. D. Runca welcoming the participants to this phase of the experience exchange the session started with the first of the outside presentations.

3.2. Presentation by Fluor Plant Services International (UK)
Speakers - Mr. B.H. Dorman - Vice President, Marketing
Mr. J. Morris - Senior Maintenance Engineer

3.2.1. Mr. Dorman stated that Fluor Plant Services International had some 8,000 staff from engineer to trademan and over 200 clients. He said they could offer a range of services including total maintenance, maintenance management, etc..

3.2.2. Mr. Morris said that Fluor had three systems to cater for differing sized requirements:

1. MTS which used Basic and a microcomputer
2. CMMS 1 which used RGP2 and an IBM 34/36 minicomputer
3. CMMS 11 which used Cobol and an IBM Series 4300/30XX

MTS could handle 1,000 files, CMMS 1 could handle 5,000 files whilst CMMS 11 was unlimited. He went on to explain how the system worked in some detail.

3.2.3. Mr. Morris then presented a short description of a development of a sister company, Loveland Controls Company, in which a computer programme has been prepared to assist in the checking and calibration of instruments.

3.2.4. In discussion it was confirmed that the system could provide for maintenance by hours run. It did not cater at present for number of starts. It could be integrated with existing stores systems. There was no fixed price as Fluor wished to provide an ongoing service. The first effect of the programme was to reduce stock inventory. Then the programme reduced manhours and increased up-time.

3.3. Presentation by Gesellschaft für Industrieanlagen-Planung (GIP)

Speaker: Mr. J. Kiehl - Marketing Director

3.3.1. Mr. Kiehl's presentation was on the use of consultants for the planning of work which did not involve licenced processes. Under these circumstances an experienced team could be provided on site which had immediate access by facsimile transfer to the programmes and back-up staff in the head office. This meant that,where licenced processes were not involved, it was not necessary to go back to the original contractor. The refinery plus consultant with his back-up support could carry out the work more economically.

3.3.2. In discussion Mr. Kiehl stated that GIP had about 100 engineers. About 50 of these were on site and 50 in head office.

3.4. Presentation by Mr. B.P. Holloway, OPEC Fund Consultant

Mr. Holloway stated that in any maintenance system the effect was only as good as the detail of the maintenance to be carried out. He drew attention to the "Guide for the Inspection of Refinery Equipment" published by the American Petroleum Institute, and the "Refining Safety Code" of the British Institute of Petroleum.

3.5. Presentation by Mr. Al-Shaban (Kuwait)

3.5.1. Mr. Al-Shaban spoke on the need to involve the maintenance engineer in the design phase of a project.

3.5.2. In discussion it was agreed that the maintenance engineer should be a member of the project control team. It was felt that the job description for a project engineer should include a requirement to have served for a time in the maintenance department of the same refinery. The maintenance engineer should be involved in inspecting the plant and equipment during manufacture.

3.5.3. Conclusion:

It was agreed that the attention of management should be drawn to the desirability of involving the maintenance engineer during the design phase as a means of improving the operational efficiency of the completed plant.

3.6. Presentation by Mr. A. Ertem (Turkey)

3.6.1. Mr. Ertem spoke about the human effects of introducing computerized maintenance. He considered that such systems were involved in reducing labour costs but in LDC's labour costs were much lower and the system would not produce the same savings. In Turkey they were involving the labour force in the management role. They had allocated pairs of pipefitters to each area. They had set up local stores. The teams were responsible for steam leaks and had achieved a significant reduction in steam consumption. Due to the reduced labour costs the pay back time would be much greater in LDC's. He considered that UNIDO should make available data on comparative costs.

3.6.2. In discussion it was stated that all refineries should start by conducting an Energy Audit. This was of greater value than comparing statistics. In Turkey they were using local material of lower quality as they found this more economical even if they had to maintain on a six month basis rather than annually.

3.6.3. Conclusion:

It was concluded that it was necessary to take full account of the human factors in any maintenance system. Trademen were the eyes of the maintenance manager and must be encouraged to look for and report all malfunctions.

3.7. Presentation by Dr. P. Strauss, OMV AG

3.7.1. Dr. Strauss presented a talk on the computerized system for Warehouse Management and saving storage space in use at OMV AG. This paper is attached as Annex 8. This system had achieved savings of about 50% of the storage space required for the holdings of the OMV stock. This was achieved by binning parts according to their space requirement. This meant that a store location had no other significance than the spatial one. In order to find the space it was necessary to have a very efficient management system. This was provided by the computer. When the computer was not available parts could be located by means of microfiche and viewers available in all 85 store-houses. The microfiches were produced monthly from the current computer printout.

3.7.2. Questions:

1. In answer to question Dr. Strauss stated that OMV AG had 65,000 catalogue items. Due to the multiple storage locations this meant 120,000 storage items. The warehousing programme required a computer capacity of 20 M bytes. The total stored programme required 200 M bytes.

2. Mr. Al-Shaban (Kuwait) said that in some cases the supplier would only provide a complete set of parts. How could the system cope when only one item of the set was required.
Answer: Each case must be examined on its own merits. It might be possible to break a set down into components and replace used items such as O rings from another source. On the other hand the cost of trying to account for a subdivided set may be greater than the cost of the complete set.

Wednesday, 21 November

1. The session was opened by Mr. M. Maung, Chief, Fertilizers, Pesticides and Organic Chemicals Unit, who spoke on the financial resources of UNIDO and the ways in which UNIDO is able to assist developing countries. In particular he talked about the programme of technical co-operation and special industrial services. He explained how proposals for such assistance could be initiated by the participants through their own Government channels.

2. Topic: Corrosion Problems

2.1. Introduction: Many of the participants have stated special interest in the corrosion problems they meet in their refineries. The particular aspects are as follows:

2.2. Tank corrosion: Mr. E.G. Danquah (Ghana)
Mr. E.M. Osman (Sudan)

2.3. Units and components: Mr. R.A.C. Perez (Cuba)
Mr. T. Mulu (Ethiopia)
Mr. E.G. Danquah (Ghana)
Mr. E. Ferreira (Mozambique)
Mr. N.N.I.R. Fernando (Sri Lanka)
Mr. S.R. Saeed (Yemen)

2.4. Sea water piping: Mr. T. Mulu (Ethiopia)
Mr. E.G. Danquah (Ghana)
Mr. A.S. Amaar (Libya)
Mr. Y.O. Mlungura (Tanzania)

Most of the above participants have included details of corrosion problems in their technical reports. The applicants from India, Mr. S.R. Kumar and Mr. E. Uddin also submitted technical reports on this topic.

3. Sea water intakes:

3.1. Mr. A.S.S. Amaar (Libya) presented his report on the novel way the accumulations of marine growth and silt had been cleared from their refinery sea water intakes. This was done on a self-help basis after receiving expensive proposals from contractors. In the discussion it was pointed out that in Ghana they had had a similar problem but the pipelines were 5 km long. They had cut manholes for access and put divers in to clear by hand. The pipes were concrete lined with one section of carbon steel which was the worst affected. This had been replaced by a section of Fibreglass which resisted marine growth. In Tanzania the pipes were about 1 km long and concrete lined. They had manholes for inspection but dosed with chlorine at the sea end. Due to the cost and hazard of using chlorine the desire was expressed for an alternative. It was agreed that there was probably no satisfactory alternative but that the hypochlorite could be produced by electrolysis of sea water which should prove more economical and avoided the hazard of handling chlorine gas. The use of thickwall, schedule 40 or 80 PVCC piping, was advocated for the hypochlorite line. The use of fibreglass piping was advocated and it was reported that it was being used for hot acid mixing tanks in Ghana so would stand elevated temperatures. Both Cuba and Kuwait reported that they were using concrete lined pipes successfully for sea water intakes.

3.2. Corrosion of heat exchanger:
It was reported that in Cuba sea water cooled heat exchangers were constructed of Admiralty Brass B 111 grade B but it had been found necessary to stress relieve the tubes and to temper the tube ends.

3.3. Fire fighting systems:
After discussing the problem of the use of sea water for fire fighting systems it was concluded that the systems could be charged with fresh water with the pumps only handling sea water in the event of a fire.

3.4. Tank corrosion
It was reported that in Ghana trouble was being experienced with the corrosion of the middle courses of a 6 course floating roof tank containing leaded gasoline. The Octel Co had stated that the corrosion was not attributable to TEL. The tank had been sandblasted and 600 mil epoxy paint coating had been applied consisting of a primer coat, 2 base coats and 2 top coats. There was no rubbing of the paint by the floating roof. It was considered that probably the sandblasting was inadequate. It was reported that in Kuwait they sandblasted to SAE 2 1/2 standard and had no trouble. It was agreed that more accurate description of the standard of sandblasting was desirable. There was some discussion of new painting systems coming on the market which would coat over rust and could be applied to wet surfaces. Not sufficient was yet known for an opinion to be formed.

3.5. Cathodic protection:
It was reported that trouble had been experienced in Ghana due to contaminated zinc anodes bought commercially. These had been replaced with locally cast anodes incorporating some aluminium. This had proved satisfactory. It was reported from Cuba that a satisfactory solution had been found by lining the water boxes with lead, with naval brass 171 tubes and plates and silicone bronze seats. Sacrificial anodes had been installed. Further discussion was posponed till the next day.

4. Topic: Energy Conservation

4.1. Introduction: Whilst only two delegates, Mr. A. Intiyanaravut (Thailand) and Mr. A. Ertem (Turkey) stated a special interest in energy conservation, Mr. Intiyanaravut submitted a well argued report based on his experience. It is considered that this is a subject of special importance to all refineries but especially in developing countries. It was not included in the OMV programme because of time restriction.

4.2. Mr. Intiyanaravut (Thailand) presented his paper on the reorganization of Military Oil Refinery in which major steps had been taken towards improving the energy balance. The major changes were in the improved operation of the plant and in the recovery of condensate from the steam system. Waste heat boilers were to be installed to recover flare gas. Non of the other refineries reported any attempt to recover flare gas. The impression had been gained that this could only be attempted by purchasing the system patented by OMV AG. Possibilities were discussed.

4.3. Mr. Ertem (Turkey) presented his paper on the measures they were taking to improve their steam consumption. This was through an energetic attack on leaking steam traps. It was hoped to manufacture replaceable steam traps in Turkey. Insulation to pipes was being improved. It was reported that difficulty was experienced in measuring results due to inadequate instrumentation As the improvements were only likely to be of the order of 0.5% to 1%, a high degree of accuracy was required in the measurements or else the changes would be lost in the instrumentation error.

4.4. Conclusion:
It was agreed that a high priority should be given to improving instrumentation required to measure the results of measures to improve energy conservation.

Thursday, 22 November

1. Experience Exchange Group

1.1. The group discussed the future of the concept of an Experience Exchange Group and came to a unanimous decision that they wished the group to continue on a permanent basis.

1.2. Discussion:
It was agreed that now that the technological level of the group had been established it would be possible for participants to prepare papers, especially case studies, for presentation at the meeting. This had not been understood before this meeting and so participants had not been fully prepared for the discussions. It was generally considered that the period at OMV AG had been too intense. The level of subjects was generally beyond the normal experience in LDC's and much could not be directly related to the work of the participants. The amount of instruction had been too concentrated especially as for most of the participants English was not their first language. Some topics such as Energy Conservation were very broad and attention should be directed to specific points.

2. Oil Loss Control

Copies of a summary of the papers read at the conference held by the Institute of Petroleum in London during October 1984 were presented to the delegates. Attention was drawn to the remarks made by Mr. H.L. Fenner of Esso Europe Inc. about the need to improve the accuracy of measurement in the industry. Esso had now set guidelines seeking an accuracy with a 95% confidence level of plus/minus 0.2%. He stated that most refineries had an energy conservation programme which had a close correlation to oil loss so that the two elements should be monitored together.

3. Discussion continued on the topic of corrosion.

3.1. Mr. Fang Jian Zao (China) described the problems they had been experiencing with pressure vessels for hydrocracking, with operating temperature of 450-500°C and pressure of 150 bar. They have two types of reactor - cold wall with refractory lining and hot wall. The cold wall reactor is of carbon steel with an inner liner of E 347. After a long period of use hot spots appear. To continue operating it is sometimes necessary to direct a blast of cooling air from a fan on the hot spot. Eventually, however, it is necessary to shut down and repair the leak in the liner and replace the defective refractory. The newer reactors were designed as hot wall vessels of ? 1/4 Cr 1Mo steel or 1 Cr 1/2Mo clad with 3 to 6 mm E 347. This, however, has produced a problem of the cracking of the base material under the cladding. This is difficult to detect but is probably due to differential expansion of the base metal and cladding. Answers are required to the following: Between cold and hot wall reactors which is more free from failure and which is simpler in maintenance inspection and repair? Which is cheaper? How do you solve the problems described above? What is the best material to choose for a platforming reactor exposed to high temperature (540°C) and hydrogen? If you use 1 Cr 1/2Mo or 2 1/4 Cr 1Mo what will happen after long service? Can you weld pressure vessel or pipes of CrMo steel using austenitic stainless steel electrodes? How can you prevent hydrogen attack in practice?

3.2. It was stated that in Cuba they have both types of reactor. They had a failure on a cold wall reactor and it was decided to remove the inner liner as being unnecessary. After a short while they had had to replace it. They used E 347-15 or 16 electrodes. It is necessary to dry out the electrodes very carefully before use. They apply a low pressure test, about 30 psi, between the shell and liner to test for leaks. It is a floating liner and they have had no more trouble. The operating temperature is 430°C and 430 psig (about 30 bar).

3.3. It was pointed out that the cost of a new reactor was very high, about US$20,000/ton. The cost of the liner is US$60,000/ton. A reactor under construction in Japan weights 4,000 tons.

3.4. It was reported that in Ghana they had had a small crack in one reformer reactor. Although they had repaired one previously it was recommended that they replace all four reactors. Although they were 18 years old this was considered wasteful.

3.5. Sri Lanka reported that they had a lamination problem in the cap of a naphta reforming reactor after 13 years in service. It was found by ultra-sonic investigations and the technique had not been used before on this cap. The laminations were extensive but there was no indication yet why they had occurred nor how long they had been in existence. The pressure was 700 psig and the temperature 340°C. It was considered that this was probably a material defect which had always been present but not previously identified. This indicated the need for the maintenance engineer being present during the manufacturing stage.

3.6. Mr. Ertem (Turkey) gave a talk on developments in Operational Research. Although he had not had the opportunity to use the techniques in Turkey he considered that engineers should study them as they could be of great assistance in problem solving.

Friday, 23 November

The morning session was devoted to a visit to the Computer Centre of OMV AG where participants were able to experience at first hand the retrieval of information on Warehousing and Stores Control.

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INDUSTRIAL INVESTMENT PROJECTS PROMOTION IN ARAB COUNTRIES *

Prepared by the
Investment Co-operative Programme

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This paper draws extensively on United Nations and UNIDO publications, especially the Manual for the Preparation of Industrial Feasibility Studies (Sales No. E.78.IIB.5): Guidelines for the Preparation of Agricultural Investment Projects (OPS/FAO/INF.3): Manual for Evaluation of Industrial Projects (Sales No. E.80.II.B2);"Project financing and the experience of UNIDO in project promotion" (UNIDO/IO.551/Rev.1): and Investment Promotion Information System (PI/95).

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INTRODUCTION: The Project Development Cycle

Investment projects, whether for new industrial production units or for expanding, modernising or rehabilitating existing units, are the sine qua non of the development process. An understanding of the project development cycle is essential before investment projects promotion can be approached.

According to the 1984 Annual Report of the Arab Investment Company (TAIC), investment projects in the Arab countries may be divided into three broad categories :

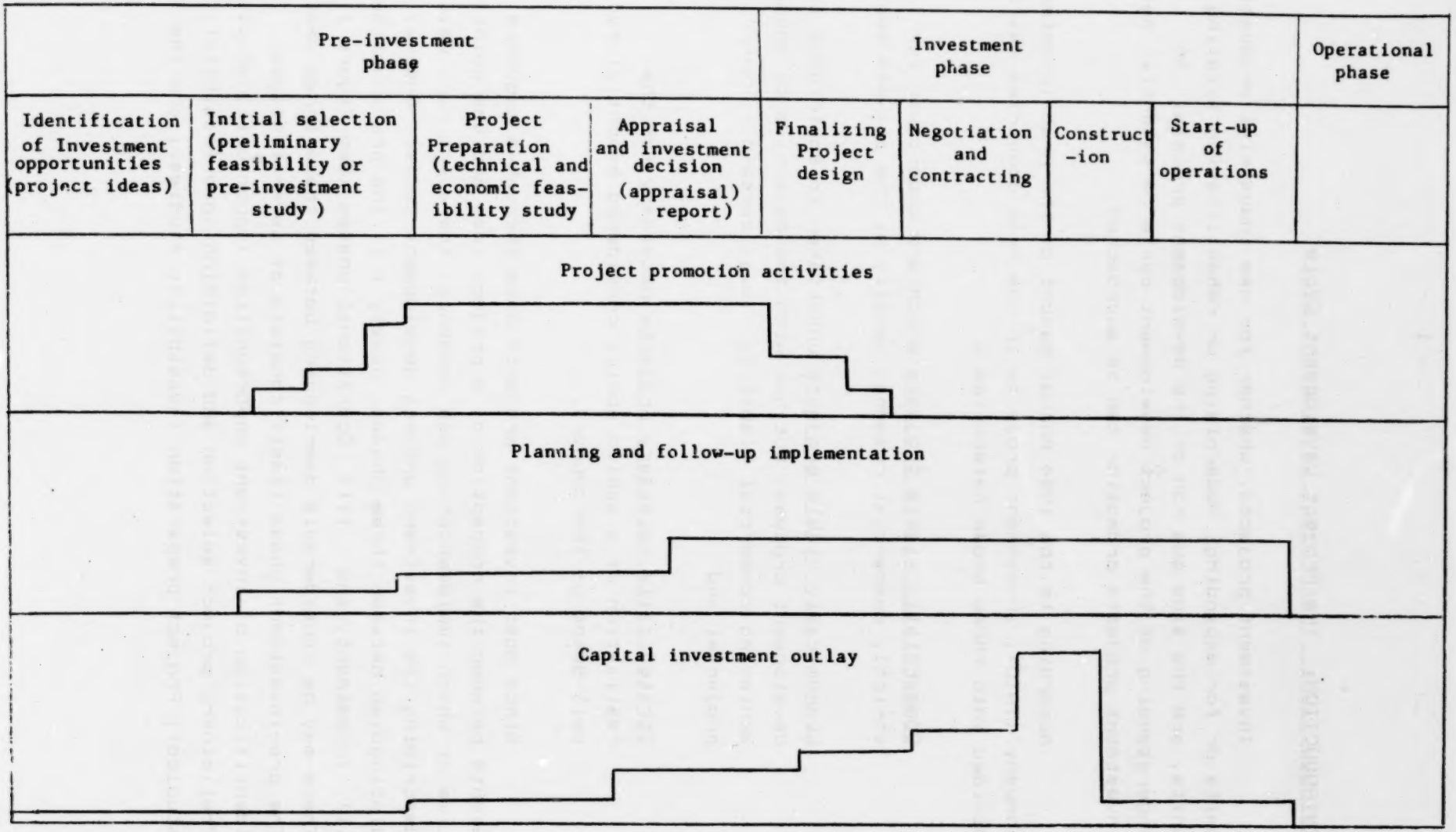
Commercially viable projects which are undertaken for strictly commercial reasons, usually by the private sector;

Economically viable projects undertaken to contribute to the development process, but not with the objective of themselves achieving commercial viability - e.g. certain infrastructural projects; and

Strategically necessary projects necessary for the realisation of a public policy considered essential for the well-being of the country.

Since most investment projects pass through a sequence of events between the conception of a project idea and the point of time at which implementation can commence, there are many ways of describing the investment project development cycle. One way is to distinguish between three phases, namely : i) The pre investment, ii) Investment, and iii) Operational phases (See Figure 1). There may be considerable overlapping between these three phases. The pre-investment phase itself consists of several stages: Identification of investment opportunities (opportunity studies); Preliminary project selection and definition (pre-feasibility studies); Project preparation (feasibility studies); and the final

Fig. 1 - Project Development Cycle



appraisal and decision whether to invest. Studies on such topics as size of market, sources of raw materials, plant location and optimum size, selection of plant and equipment, are prepared during the project formulation stage. Each of these is usually commissioned from a different individual or firm because of the special knowledge required.

Another way of describing the project development cycle, which is perhaps more suited to the operations of United Nations and other multilateral agencies, is to distinguish between four different phases: "identification", "preparation", "appraisal", and "implementation". Each phase frequently merges with the next, and the time period required to pass through each phase varies considerably.

"Identification" means defining a project idea in the degree of detail necessary both to justify governments' and/or financing agencies' commitment of the resources needed to complete satisfactory feasibility studies, and to reveal the major issues that must be tackled before the project can be implemented.

"Preparation" refers to the completion of feasibility studies on which financing institutions may base their appraisal of a project. The objective of project preparation is to demonstrate with a high degree of confidence that the project is :

- in accordance with the country's development objectives and immediate priorities;
- technically sound and representing the best of available alternatives within existing constraints; administratively workable; and
- economically, financially and socially viable.

Feasibility studies should also provide sufficiently accurate estimates of costs and revenues to enable decisions to be taken on

project financing. In addition, the description of the project should be detailed enough to permit the implementing agencies to use the study as an aid to implementation.

Project "appraisal" is a prerogative of the financing institutions and involves the critical review of the feasibility study.

"Implementation" is essentially a country responsibility but one which may be periodically supervised and ultimately evaluated by the financing institutions. Although the main implementation phase only starts after negotiations with and approval by the financing institution, certain activities, such as the completion of final designs and preparation of tender documents, frequently commence immediately after project appraisal.

When the sequence of events described above is followed, three main reports are produced on a project - an identification report, a preparation report and an appraisal report. Even though each of these reports must contain a description of the project as it is conceived or designed at each successive stage, the purpose, emphasis and context of the reports differ considerably. The most detailed is the project preparation report.

I. INDUSTRIAL INVESTMENT PROJECTS PROMOTION

Because of their infrastructural, institutional and human resource constraints, developing countries by and large face difficulties in converting their national development plans into viable investment projects. Recently the President of the African Development Bank stated publicly that "at the monent, most of our member countries have very low capacity to generate projects; more resources should be channelled into this form of technical assistance". Similar views were expressed in a recent annual report of the Netherlands Finance Company for Developing Countries (FMO) which finds it remarkable that "while financing institutions gene-ally have ample funds available, they seem to have trouble in investing these funds appropriately". The FMO finds it paradoxical

that a great need for money exists side by side with a plentiful supply of it, and attributes this state of affairs to three problem areas:

- the gulf between financiers on the one hand, and industry and government on the other in the area of information on finance and investment opportunities;

- the inadequacy of the means available to cover political and economic risks; and

- the shortage of sound, well-prepared investment projects.

A universally acceptable definition of a "sound, well-prepared investment project" is hard to formulate. The simplest way of identifying such a project is to say that it is the one which succeeds in attracting the inputs required (but not available to the project's sponsors) to bring about its implementation, i.e. a project which is successfully "promoted".

A definition of the term project promotion is somewhat easier: it comprises all the efforts undertaken by project sponsors or persons acting on their behalf to secure the inputs needed to implement a specific industrial investment project, whether in the private or public sector. Such inputs include money; plant and equipment and the knowledge to operate it effectively; technical know-how in the form of licences, patents, or simply manufacturing experience; experience of selling and distribution in the target markets, whether domestic or export; managerial skills, with particular emphasis on financial planning and reporting, and on handling the cash inflows and outflows resulting from business operations. In developing countries there is the additional requirement of imparting skills at all levels to locally recruited staff - the training input.

The need to involve the suppliers of these inputs from the very early stages of project preparation is especially true of the financial input. Potential financiers should be able to review,

modify and approve all project preparation activities as they unfold in order that their concerns regarding such topics as source and quality of raw materials, appropriateness of proposed level of technology or size of plant, realism of assumptions on market penetration, to name but a few, may be fully incorporated into the feasibility study. This is why the expression "investment promotion" is often used to describe "project promotion" activities.

Figure (1), shows project promotion activities starting soon after the preparation of a pre-feasibility study commences, reaching a peak during project formulation and evaluation phases and ending when negotiations and contracting are concluded.

In addition to a positive assessment of the viability of the investment project itself, successful project promotion also requires an assessment of the projects' sponsors and of the projects' environment, the so called "investment climate". It is often claimed that the "investment climate" in a developing country is unfavourable to projects promotion; investors, local and foreign, claim that several obstacles hamper the flow of investments into projects. The obstacles which are claimed to be hampering investments and projects promotion in the Arab countries are by and large similar to those which inflict many other developing countries

The past decade witnessed a considerable growth in the number of Arab and Islamic financing institutions seeking investment opportunities in the Arab countries. Arab countries are also fortunate in having had an investment guarantee scheme commencing its operations at about the same time. Although these financing and guarantee institutions have expanded their services and have developed innovative financing schemes; financiers still believe that many more projects could attract financing if the investment climate in some Arab countries were more favourable and certain obstacles were remedied. The most important of these obstacles include the three problem areas which were reported by the FMO

and mentioned earlier on in this report. Other obstacles include administrative and bureaucratic delays, legislative and legal restrictions and inadequacies, frequent changes in laws governing investments; the undeveloped capital markets of the Arab countries for both equity and debt operation; infra-structural deficiencies in transport, telecommunications etc. Project promotion activities would achieve a great deal if they were to be directed towards alleviating the effects of such obstacles or removing them altogether.

Finally the promotion of a project requires that its sponsors can be considered to have a reasonably good chance of providing the project with the managerial and entrepreneurial skills required to ensure its sucess.

The pre-investment phase of a project's development cycle is of critical significance to the success of project promotion activities. This is especially true of the pre-feasibility and feasibility study stages of this phase.

The promotion and implementation of industrial investment projects have suffered from a lack of attention to these stages of the project cycle. This has caused a number of promising feasibility studies either to remain unimplemented, or, if implemented, to result in unsuccessful ventures. The problem arises when endeavours to promote and finance a project are delayed until the full feasibility study has been completed. At this point suppliers of finance and other inputs required for the ultimate implementation of the project often find that the feasibility study's terms of reference should have taken account of additional data and assumptions which they feel are relevant.

The opportunity study or pre-feasibility study provides an initial technical, financial and commercial evaluation of the project; once its potential viability is confirmed, project promotion activities can commence by seeking sources of finance, marketing opportunities, suitably qualified local sponsors, and partners from

the public or private sector, in the country itself or abroad, and also by proceeding with a full feasibilty study.

The purpose of a feasibility study is to provide the information - technical, financial, commercial, managerial etc needed for the decision whether to proceed with an industrial project. The study should define the project's parameters on the basis of reasoned assumptions regarding production capacity, plant location, level of technology, raw material supplies and other inputs, and arrive at an estimate of the total fixed capital investment required and of the on-going operating costs. These forecasts, combined with a forecast of sales and other revenues makes it possible to determine an expected rate of return on investment.

To attain this objective, an iterative process has to be launched to consider the assumptions referred to above, finally selecting the ones resulting in the lowest fixed investment and operating costs that are compatible with the project's revenue and profit goals. If the option which emerges is not viable, the assumptions will require further investigation and refinement until the forecast rate of return on investment reaches an acceptable figure. The feasibility study should describe this optimization process, justify the assumptions made and the options selected. If however the project is still not viable, this should be pointed out and explained.

The term "feasibility study" is often misused by suppliers of equipment or know-how. Frequently, they describe outlines they have prepared to promote sales of their equipment as "feasibility studies." In other cases production forecasts and sales targets are derived from information obtained in an industrialized country and as such may not be applicable in a developing country. Such studies can and have resulted in the misapplication of resources. A feasibility study must incorporate the resource, market and production conditions in the country where the project will operate and this requires an analysis from which may be computed the expenses and revenues the project will generate.

In the case of projects which will be financed and managed by two or more partners it is essential that before a feasibility study is commissioned, all future partners reach agreement regarding the terms of reference of the study and the parameters and assumptions on which it is to be based. Otherwise the resources invested in an initial feasibility study may be wasted if one of the potential partners or financiers later insists that a fresh study be prepared; the problem may be aggravated if, before the repeat study is carried out, agreement has not been reached between the parties involved on their respective roles in any subsequent jointly financed and managed project. One of the functions of efficient promotion is to bring about such agreement between all those concerned in implementing a project.

A full feasibility study will of course be of great interest to potential partners, but where progress towards project implementation depends on their carrying out or financing further studies, it may be impeded by their unwillingness to do so. While the project is still at the pre-investment phase, this difficulty can often be overcome by ascertaining the requirements of all prospective partners regarding the first full feasibility study, for which it may be possible to obtain finance from Government, development agencies or other industrialists.

II. THE EXPERIENCE OF UNIDO IN PROJECT PROMOTION

Although all of the technical assistance, and supporting studies, programmes of UNIDO directly or indirectly contribute towards assisting developing countries in promoting their investment projects, the importance of effective project promotion to developing countries has prompted UNIDO to begin, several years ago, to assist them through a special project promotion programme with the following main components:

(A) Identification and preparation of industrial investment projects:

Obviously project promotion activities cannot commence until some suitable projects have been identified and prepared, at least in a preliminary manner. One of the major regional development finance institutions recently reported that "experience showed that one of the greatest impediments to rapid and balanced development is the lack of a sufficient number of projects that are technically and economically well formulated. In most of the countries - especially the relatively less developed ones - there has been a manifest lack of institutional mechanisms within the planning agencies that would enable them to convert development plans into specific projects and operational programs adequate in terms of quantity and quality to present clear investment alternatives leading to more rapid and sustained growth". Therefore UNIDO assigns high priority to assisting developing countries in strengthening institutions concerned with projects identification and preparation, as well as in the identification and preparation of investment projects.

Assistance is extended, at the request of developing countries, by sending UNIDO staff members and/or consultants to developing countries to identify and to prepare industrial investment projects. This type of assistance is being or was extended by UNIDO to several Arab countries including Morocco, Egypt, Sudan, Yemen Arab Republic, Djibouti and Somalia. For example, in 1981 an industrial sector mission was undertaken to Yemen Arab Republic (YAR). The mission's activities in the preparation of investment projects concentrated on three projects, namely a mechanized stone-quarrying and cutting operation (estimated cost $20 million); a plant to produce 60,000 tons of concrete products annually (investment cost of $9 million) and a project for the manufacture of hollow glass (investment cost about $17 million).

UNIDO also assists by providing experts to set up and operate, for varying periods of time, industrial advisory units located within a ministry of industry, a national promotion institution or an industrial development bank. The primary objective of these units is to strengthen national capabilities in the identification, preparation, appraisal and promotion of industrial investment projects. Such units have been established, with UNDP financial assistance, in 16 countries including Mauritania, Oman and Saudi Arabia. Each unit usually comprises a team of UNIDO experts e.g. an industrial economist, a market analyst, technologists and a financial analyst. These experts work closely with qualified national specialists who continue the work after the UNIDO experts' departure. Such units are of particular value in least developed countries where the project identification and preparation skills are scarce. Through these units UNIDO finances or co-finances the preparation of many pre-feasibility and feasibility studies.

In 1983 a trust fund agreement was signed with the United Arab Emirates Industrial Bank primarily to assist the Bank in strengthening its capacities in economic analysis and the identification and promotion of viable investment projects. Assistance covers the appraisal and evaluation of pre-feasibility studies, the preparation of terms of reference for the selection of qualified consultants and the promotion of regional co-operation among the member States of the Arab Gulf Co-operation Council.

UNIDO also organizes training seminars for the purpose of upgrading national skills in project identification, preparation, appraisal and financing. Arab professionals participate in national seminars held in their own countries (e.g. in Sudan in 1984) or in regional and inter-regional training seminars held outside the Arab countries (e.g. the annual inter-regional training seminar held in Warsaw, Poland). In 1983 a similar training seminar, with emphasis on

the financial analysis of projects, was conducted for the staff of the Islamic Development Bank at the latter's Headquarters in Jeddah.

A number of documents have also been prepared by UNIDO with the aim of supporting and facilitating projects identification and preparation activities. These documents include:

a) "How to Start Manufacturing Industries" which consists of brief profiles of various manufacturing industries. Annex 1 contains two samples of these profiles. At present this publication covers almost 200 different manufacturing industries. It is hoped that financing will be found in the near future to translate these profiles into Arabic.

b) "The Industrial Investment Project Questionnaire" (IIPQ) which guides project sponsors in developing countries in preparing a meaningful and complete project file for use in promoting the latter. In the IIPQ the project sponsor gives details on the products to be manufactured; the intended capacity of the plant; the energy, raw material and labour requirements; the proposed markets, the cost of the project, sources of finance and most important of all the foreign inputs or contributions required. Whenever possible, UNIDO screens the projects so identified and points out any inaccuracies, deficiencies or inconsistencies to the project sponsor.

c) "Manual for the Preparation of Feasibility Studies" and a "Computer Model for Feasibility Analysis and Reporting" (COMFAR) which facilitates the numerous computations required in preparing feasibility studies.

d) A "User's Guide for the Project Profile Screening and Pre-appraisal Information System (PROPSPIN), which is a simple project analysis tool originally developed for

internal use by UNIDO. PROPSPIN makes it possible to quickly prepare a verifiable physical and financial profile for a proposed industrial investment project.

e) "Manual for Evaluation of Industrial Projects" which was prepared jointly by UNIDO and the Industrial Development Centre for Arab States. The Manual was published in Arabic in 1977; it presents a relatively simple step-by-step industrial project evaluation methodology which could be applied in every day practice by an average qualified project evaluator, with an average availability of data, and taking into account other limitations existing in developing countries.

(B) Collecting and disseminating information on various topics relevant to project promotion and investment climate including publicizing developing countries' investment projects to as many of the suppliers of the required inputs as possible:

a) Country Investment Profiles: At the early stages of considering participation in an industrial project in a developing country, a potential investor very often knows little about investment conditions prevailing in that country. Country reports are published by a number of banks, economic institutions and international organizations, but these usually do not contain the sort of data that would be of interest to a prospective investor. UNIDO therefore decided to prepare a set of profiles of developing countries containing precisely this type of information. These Country Investment Profiles are issued in a standard eight-page format and start by giving general country data, economic indicators and information on the balance of payments, the infrastructure and the structure of the manufacturing sector. More specific information is then given on the general principles of foreign investment, financial transfers, patents and trademarks, taxation, labour and incentive schemes. The final part of the profile provides examples of existing manufacturing enterprises in the country,

sources of industrial information, names of financial institutions and a map of the country. These profiles are now available for 104 developing countries, including 16 Arab countries.

b) The UNIDO Computerized Investment Promotion System (INPRIS) now has five searchable data banks, namely Project File, Investor File, Bank File, Institution File and Sponsor File:

Project File

The project file contains summarized information on some 2,000 industrial investment project proposals in developing countries that require some form of foreign co-operation, such as joint-venture or other partnerships, acquisition of technology, management expertise and marketing assistance. UNIDO actively identifies such projects from private and public sources in developin g countries such as ministries of industry, development corporations, investment promotion agencies, local manufacturers etc. Information on these projects is recorded on the UNIDO industrial investment project questionnaire (IIPQ). Once a project is considered acceptable for promotion, it is given a number and classified according to the International Standard Industrial Classification (ISIC). Essential data from the project is then entered in the project file.

The record therefore includes a description of the products to be manufactured and the proposed capacity of the plant, an estimate of the cost of the project and an indication of the foreign co-operation sought. The existence or otherwise of a study and a local sponsor is also indicated. (A specimen record from this file appears in annex 2).

Once a project is recorded in the project file, it is promoted in one of three ways. First, lists of the projects being promoted are published two or three times a year. These lists are in the form of booklets and are reproductions of computer

print-outs. About 3,500 copies of these lists are distributed to potential partners, as well as to development finance institutions, official aid agencies and similar organizations. Once any of the latter has identified a project of potential interest, a copy of the IIPQ and any available supporting information can be requested from UNIDO. The IIPQ contains the name and address of the project sponsor, thus allowing the potential partner to contact the sponsor in the developing country and initiate negotiations.

Secondly, UNIDO receives requests from various quarters for information on projects in specific industrial sectors, countries or regions or on projects seeking a particular form of co-operation, such as a joint-venture partnership, the supply of technology, participation in equity etc. As it is possible to search for information using any combination of parameters (e.g. projects in the furniture industry in Jordan seeking access to foreign markets), replies to such requests take the form of computer printouts giving the desired information. As in the case of the project lists, further information in the form of project questionnaires etc. is available for each project whose summary appears in a personalized printout.

The third way in which projects in the project file are promoted is through increased use of communication networks and access to remote data banks. Copies of tapes of project information are supplied to selected institutions and companies that specialize in this type of data. Subscribers to such services are therefore able to find out from sources other than UNIDO about projects being promoted by UNIDO.

Investor file

The investor file is a directory of about 3,000 public and private enterprises that have indicated a willingness to consider participation in industrial projects in developing countries. These enterprises are located in industrialized countries and in some developing countries. UNIDO has conducted

surveys in a number of countries of enterprises that were found to satisfy the criteria established for inclusion in the investor file, namely that enterprises had to be medium-sized manufacturers, they had to have at least a medium-term commitment in the project, and the industrial sectors in which they operated had to correspond to the needs of the developing countries. These surveys are the main source of information on potential project partners. In addition, firms are added to the investor file as a result of visits to UNIDO by company officials, requests received in the mail, contacts through diplomatic missions to UNIDO etc.

As may be seen from the specimen in Annex 2, the data entered in the computer include the name and address of the firm, the person to be contacted within the firm, the products that could be manufactured jointly and the preferred countries or regions where co-operation could take place. As in the project file, the products are classified according to ISIC, which allows direct matching between the two files.

Firms that are entered in the investor file regularly receive copies of the project lists referred to earlier. Their names also appear in searches of the data base when inquiries are received from ministries of industry, investment promotion agencies etc. in developing countries for information on potential partners for a particular scheme. The versatility of the searching system allows multi-faceted questions to be asked (e.g. which potential partners in Italy would be interested in a textile project in Sudan). In addition these firms receive invitations to investment promotion meetings and country presentation meetings organized regularly by UNIDO.

Information from the investor file is published in a booklet called "Industrial Partnership Proposals" which is a compendium of all the products manufactured by the firms contained in the investor file that could possibly be manufactured as a result of co-operation between a local project sponsor and a foreign

entrepreneur. This booklet has a wide distribution and is aimed primarily at institutions and organizations in developing countries that may be sources of industrial investment project proposals (see "Institution file", below). It serves to stimulate the generation of ideas about possible production in a given country.

Bank file

UNIDO is not a financing institution and is therefore unable to participate financially in manufacturing projects in developing countries except, to a limited extent, in financing "software" components of certain projects, such as feasibility studies, training etc. UNIDO is, however, able to bring project proposals to the attention of development finance institutions and can also provide information on such institutions to project sponsors and potential partners.

The bank file contains information on approximately 600 international, regional (including Arab and Islamic) and national development finance institutions. A sample record from this file appears in Annex 2. A list of development finance institutions that are willing to finance projects in a particular country or region can be obtained from this data base. Other information that can be generated includes the length of time for which the institution will give loans and its lending limits, whether the institution will finance the study or preparation of projects, whether it will provide export credit etc. Once again, it is possible to make compound searches in the file (e.g. a list of all development finance institutions that will take equity in projects in the private sector in Tunisia).

Institution file

Infcrmation on industrial investment project proposals reaches UNIDO from a variety of public and private sources in developing countries other than private entrepreneurs. These sources include ministries of industry,

investment promotion agencies, development corporations, manufacturers' associations and so on. In order to assist the Programme in its contacts with such project sources, about 1,100 institutions were brought together in a single data base. A typical example of such an institution appears in Annex.2.

This data base is used in preparing names and addresses of appropriate institutions to be visited when UNIDO staff members are in the field identifying projects. Institutions recorded in the data base also receive relevant material on investment promotion activities, such as Industrial Partnership Proposals referred to above.

Sponsor File

From time to time UNIDO receives information regarding plants in industrialized countries that are closing down for commercial reasons but that still have a useful technical life left and a technology that is still perfectly applicable in a different operational environment. These plants are very often disposed of for a fraction of the replacement value of the plant and machinery, sometimes for only little more than their scrap value. One of the major concerns of the owners of such factories is to dispose of them while the machinery is still productive.

Since a number of plants that cease operations manufacture products that are sought by developing countries (e.g. food products, textiles, footwear, wood products, chemicals, metal products), it was decided to build up a data bank of firms in developing countries that could be interested in learning of such redeployment possibilities. Information on around 1,000 such firms, exemplified by the record in Annex 2, is drawn from the UNIDO Investment Promotion Information System project file, the UNIDO Newsletter, participation from developing countries at investment promotion and other meetings, visitors to UNIDO and so on.

Once information on a redeployment possibility reaches UNIDO, a search is made in the sponsor file, and copies of the information are mailed to the firms that appear in the search. If the offer is of interest to one of the recipient firms, this firm can establish contact with the appropriate executive in the plant concerned with a view to negotiating the acquisition of that plant. It would also be logical to have a data bank of redeployment opportunities, but as the life of each offer is so short this is not considered feasible.

c) The UNIDO Investment Promotion Services (IPSs)

The network of UNIDO Investment Promotion Services was established in order to accelerate the flow of financial, technological, managerial and other resources from industrialized to developing countries. These Services, which are almost exclusively supported by host country contributions, make it possible for developing countries to have direct access to technological and financial sources in industrialized countries. UNIDO currently has Services in Cologne, New York, Paris, Tokyo, Vienna, Warsaw and Zurich. (See Annex 3 for the addresses of these services). The interest on the part of both developing and industrialized countries in this activity continues and advanced negotiations are underway for a Service to be opened in Milan, Italy.

It is planned to include a number of developing countries in this network, thereby widening the possibilities for other developing countries for further industrial co-operation in the form of technology transfer and creation of new joint venture projects. Discussions are currently underway with Brazil, India, Republic of Korea, Mexico and the Gulf region.

One of the primary activities of the Investment Promotion Services is to develop, provide and follow-up on contacts between sponsors of industrial projects in developing countries and potential partners in industrialized countries. During the

period 1980-84, these Services succeeded in launching 25 industrial projects in 10 Arab countries with an estimated total investment cost of about $US217 million (see Annex 4). As experience has shown, it is highly probable that many more projects have been launched, especially through contacts provided by the Services during Country Presentation and Investment Promotion Meetings. Exact quantification of the results of such an activity is difficult since both sponsors and partners are often reluctant to make this information public. The projects reported as concluded by the Services are a result of a wide range of intensive promotional activity, including initial assistance in project formulation and presentation, researching potential partners, and providing access to small and medium size enterprises, arranging meetings both in the industrialized and developing countries, and providing information and assistance in preparing the financial package. To carry out these activities, the Services have expanded their computerized data banks of potential partners and are making use of external data banks which contain useful investment promotion and marketing information. To keep this project information current, the latest transactions are communicated to UNIDO headquarters, where they are entered in the INPRIS Project File and can be obtained by all concerned.

Another activity of major importance is to make potential partners, especially the small- and medium-sized enterprises, aware of the potential of the developing countries. Besides providing continuous information through the mail and through personal contacts, the UNIDO Investment Promotion Services organize Country Presentation Meetings, whereby representatives of the developing countries make presentations to groups of industrialists, financiers and to professional and government institutions, informing them about their countries' potential, material and human resources, laws relating to investment in their countries as well as potential sectors and specific projects for investment. In the Arab region, Country Presentation Meetings were organized for Egypt, Mauritania, and

Somalia. These Country Presentation Meetings are often a prelude to Investment Promotion Meetings which UNIDO organizes for the developing countries. The IPSs make a major contribution to the success of such meetings in their countries and mobilize the participation of potential partners in these meetings.

Complimenting the investment promotion activities undertaken above, the Services carry out a number of activities which are geared for the particular situation in their respective countries and are often innovative in nature. For example, the Pre-Investment Facility established by the Zurich IPS continues to provide initial assistance to small and medium Swiss companies, enabling them to complete pre-investment activities to enter into partnerships with developing countries. The Zurich IPS also mobilized 14 scholarships in Swiss industries, research and management institutions and universities, for executives of public and private institutions from developing countries.

d) Investment Promotion by teleconferencing

A video teleconference via satellite took place in April 1982. Sponsored jointly by UNDP, UNIDO and the United States Overseas Private Investment Corporation (OPIC) the teleconference brought together potential partners in six cities in the United States of America and leaders from Government and business in Egypt. This live presentation, the first of its kind involving UNIDO, allowed over 600 Unites States industrialists, bankers and businessmen to learn about Egyptian foreign investment policies and to engage in question-and-answer sessions covering various industrial subsectors. The high cost of this first teleconference was covered mostly by OPIC.

(C) On-the Job Orientation Programmes for Government Officials from Developing Countries

UNIDO believes that one of its main objectives is to impart knowledge on the techniques of project promotion to interested

developing countries so that they may carry out this activity in the best interest of their countries. In 1978 a programme was initiated by the New York IPS to provide on-the-job orientation and guidance for those developing countries which wanted to send their officials to New York to engage in investment promotion for their countries. In this manner UNIDO made facilities and staff guidance available to the developing countries at a minimum cost and helped them launch their own country's project promotion activities. Due to the positive results of this programme, other IPSs have embarked on similar programmes.

The programme enables a number of officials from project promotion agencies or similar institutions in developing countries to be attached to one of UNIDO's Investment Promotion Services for a period of up to one year. During this time, the officials are introduced to project promotion techniques by UNIDO staff whose aim is to guide them in promoting industrial investment projects in their individual countries and in locating, and negotiating with, potential partners in the host country. Annex 5 gives the names of the 27 Arab nationals (from 11 Arab countries) who participated in the programmes during the period 1978-85.

Morocco, which sent participants to the programme for three years, was able to establish its own investment promotion office in New York after completing the UNIDO orientation programme.

(D) Organising Investment Promotion Meetings (IPMs) for Developing Countries

These meetings are often also referred to as "Investors Fora" because they are not "meetings" in the usual sense. Although each meeting is usually held during five working days in a developing country, only about two to four hours of these five days are spent in plenary type sessions. The rest of the time is devoted entirely to pre-arranged and private bilateral discussions between a project sponsor and a potentially interested investor, joint venture partner, or supplier of any of the foreign contributions required by

the project sponsor. UNIDO staff participate in these bilateral discussions only if requested by all parties concerned. The documentation for IPMs usually consists of a list of the investment projects which were submitted for promotion by local projects sponsors from the public or private sectors. These investment projects are usually prepared with UNIDO assistance well in advance of the date of the IPM to allow sufficient time for UNIDO to contact potential suppliers of the required foreign contributions and for the latter to arrange to attend, at their own expense, the IPM in the concerned developing country. In addition to the projects lists, UNIDO also assists by preparing an "Investors Guide" for the developing country where the IPM is to be held. IPMs may be national, covering one developing country, or regional covering several developing countries. Projects submitted to IPMs may cover one industrial branch or the entire industrial sector. IPMs are usually financed jointly by the governments of the developing countries concerned, UNIDO, and UNDP.

In spite of the troubled economies in most developing countries, international interest and participation in investment promotion meetings has grown substantially. Fifteen IPMs were held between February 1980 and March 1985. Three of these IPMs were held in Arab countries. The first, a national IPM, was held in Rabat, Morroco in February 1980. Some 300 Moroccan participants and a similar number of foreign potential partners or investors, including several from advanced developing countries, and from oil exporting Arab countries, attended the IPM. About 80 investment projects were submitted to the meeting. UNIDO's preparation for this IPM included financing the visit of a senior official from the Morroccan Office Pour Le Developpement Industriel (ODI) to Kuwait, Doha, Abu Dhabi, Riyadh and Jeddah to become better acquainted with Arab and Islamic financing institutions and their operational terms and conditions. The ODI official was accompanied by a UNIDO staff member and the visits to financing institutions provided a unique opportunity for on-the-job training in the techniques of project promotion. The Inter Arab Investment Guarantee Corporation (IAGC) extended every assistance possible in arranging meetings and contacting financing

and potential investors in the Arab countries visited by the Moroccan official. The IAGC also delegated one of its own staff to accompany the mission in some of the Arab cities visited.

The second IPM was held in Abu Dhabi in November 1981. The timing of this meeting was arranged so that it took place during the Arab Gulf States Industrial Exhibition. About 130 business firms and organizations participated in the meeting. Of these 37 were from Arab countries (Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates) and about 93 from foreign firms. Because of the desire of the Arab organizers to hold the IPM at the same time as the Industrial Exhibition there was no time for the preparation of specific investment projects for submission to this meeting. However, the representatives of the Arab business firms reported that some project ideas resulted from the bilateral discussions. Furthermore, the attendance at the IPM by representatives of the Arab Gulf Co-operation Council resulted in the later implementation, by UNIDO, of a number of studies covering specific industrial branches in Arab countries in the Gulf.

The third IPM was held in Khartoum in March 1985. This was a regional meeting in which four Arab countries (Djibouti, Egypt, Somalia, and Yemen Arab Republic) and one non-Arab African country (Uganda) participated. About 160 project sponsors attended the meeting. Of these about 135 were Sudanese sponsors. The foreign investors attending the meeting numbered 150 and came from Europe (including five East European countries), North America and Asia. An unusually large number of projects (300) were submitted to this meeting. In addition some 200 new project ideas were either presented to the meeting or emerged from bilateral discussions held during the meeting.

These IPMs have enabled several developing countries to acquire the necessary know-how to organize their own investment promotion programmes. In some cases once an IPM had been organized jointly with the government of a developing country, (e.g. Morocco) the country subsequently organized its own IPMs at a multilateral or bilateral level.

(E) A new Program Approach to Industrial Investment Projects Generation and Promotion*

Knowing the critical importance of strengthening the capacity of developing countries to generate and promote industrial investment projects, UNIDO is continuously seeking to identify and test new, more efficient, and more effective programmes for assisting developing countries to achieve this objective. In 1983 the first such programme, dealing with the electronics industry, was implemented with financing from a special purpose contribution from the Government of Japan and small contributions from the participating developing countries: China, Phillipines, Senegal and Sri Lanka.

Basically this new program seeks to establish contacts between industrialists and qualified persons from selected developing countries and manufacturing firms in selected industrialized countries, or in other developing countries with an established manufacturing tradition in a specific industrial sub-sector. National teams, consisting of an electronics engineer and an economist, from each of the four developing countries had separate discussions in Tokyo, Japan, with about 10 Japanese electronics manufacturing firms. Subsequently, the teams met in Vienna with representatives of electronics firms from Austria, the Federal Republic of Germany, the Netherlands and the United States of America, and thus had an opportunity to compare technologies and further develop their projects.

Prior to these discussions, each national team prepared a country paper on the electronics industry in its own country, with

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* The term "promotion" in the context of this new approach does not mean promoting an investment decision on any specific project, but promoting an early and serious preliminary interest, on the part of one or more financing institutions or potential technical or joint venture partner, or others in further pursuing a specific investment project.

identification and description of several aspects, especially:

a) Obstacles to local and foreign investment in the electronics industry; and

b) investment opportunities to establish, expand or rehabilitate electronics production units.

To assist in the preparation of country papers, UNIDO prepared a proposed annotated outline of the paper, a sample project questionnaire, a list of electronics products with a brief description of each product and a paper on the global characteristics of the electronics industry.

The evaluation of the programme by the participating national teams was very positive. The teams identified a total of 29 projects, and a number of manufacturers decided to visit some of the participating developing countries to follow up negotiations on specific new projects. The programme produced a better mutual understanding of each side's concerns and interests and is expected to lead to further co-operation. Furthermore the documents prepared by UNIDO and described in the previous paragraph will also be used to assist other developing countries to identify and promote electronics projects.

The second such programme, in the field of equipment for new and renewable energy sources (biomass and solar), was prepared in 1983 and is being implemented in 1985 with financing from a special-purpose contribution from Italy.

This new UNIDO programme approach may be ideally suited to conditions prevailing in Arab countries. Some of the programme's main features are enumerated in Annex 6. Its implementation by Arab regional organizations, possibly in co-operation with The Union of Arab Chambers, could very well result in the generation of some Arab joint projects by the real actors, namely the Arab industrialists themselves, and hence pave the way for the practical realization of

Arab aspirations towards regional industrial co-operation and integration. It should however be borne in mind that the full involvement of national Arab development banks in the implementation of this programme is essential for its success.

In July 1983 UNIDO was designated lead Agency within the United Nations system for co-operation with the Organization of the Islamic Conference (OIC), in the area of investment mechanisms and joint ventures. One of the papers which UNIDO prepared for the OIC, in this connection, is entitled : "The Role of National Development Finance Institutions in OIC Countries in Promoting Industrial Investment, Including Joint Ventures, and Ways and Means of Strengthening Co-operation among them" (UNIDO/IO.599 9 October 1984). Copies of this paper have been made available to most concerned Arab organizations. The paper contains a detailed description of a programme entitled: "A Practical Methodology for Promoting Industrial Co-operation and Facilitating the Mobilization of Financial Resources, between member States of the OIC : A Programme for the Generation and Promotion of National and Multi-National Industrial Investment Projects in Selected Industrial Branches". This proposed practical methodology incorporates the new approach described above. All Arab countries are members of the OIC, and this methodology may be implemented in Arab countries after incorporating some appropriate changes and modifications.

III. PROJECT PROMOTION BY ARAB INSTITUTIONS

Realizing the importance of industrial investment projects promotion many Arab countries have either established specialized national promotion institutions or have assigned the task to existing institutions such as ministries of industries or free zones administrations. Arab project promotion activities have by and large been more successful in those countries where specialized institutions have been established and where such institutions have allocated considerable resources to investment projects generation and preparation. Such projects are promoted with both national and foreign entrepreneurs and financiers.

Because of the acute shortage of projects suitable for submission to financing institutions for appraisal and investment decision, many Arab financing institutions are finding it necessary to involve themselves in the tasks of projects preparation and promotion. The June 1984 Conference on Arab Food Security which was held in Riyadh, Saudi Arabia, is one example of such activities. However Arab financing institutions are facing some obstacles in this task. The 1984 Annual Report of The Arab Investment Company (TAIC) cites a few of these obstacles such as "the embryonic nature of much of the market information base in the Arab world" and "The different levels of development of both company law and reporting standards". In spite of these difficulties the Report considers that there is much that Arab financing institutions "could and should do in the areas of project identification and risk assessment." The Report further states that "TAIC has been active in the field of project identification, both for its own portfolio, and for others. During 1985 TAIC plans to expand and develop its capacity for risk assessment and to provide this as a service to others."

The Inter-Arab Investment Guarantee Corporation (IAIGC)

Article 2 of the Agreement which set up the IAIGC stipulates the main objectives of the Corporation to be :

1) provision of guarantees against non-commercial risks for Arab investors; and

2) promoting the flow of investments between Arab countries through the implementation of supportive activities especially those related to the identification of investment opportunities and to the investment climate in Arab member countries.

In fulfillment of its project promotion objective, the IAIGC has successfully undertaken a variety of activities. These include:

i) preparing and publishing :

a) Investors Guides, studies on the economic and investment situation, and guides on how to form companies covering several Arab countries;

b) An Encyclopaedia on investment legislation in Arab countries;

c) Manual for the preparation of investment codes; and

d) Comparative studies of Arab national investment legislation and the Unified Connection on Investment Laws of the Arab countries.

ii) Maintaining a roster of Arab investors - individuals, companies, banks and corporations.

iii) Publishing a bi-monthly Arabic newsletter entitled "Investment Guarantee" which is widely distributed in Arab countries. This Newsletter includes a permanent section for the dissemination of information on Arab projects seeking financiers as well as Arab investors seeking projects in Arab countries.

iv) Participating in the organization of the first and second Arab Investors and Businessmen Conference which were held in Taif, Saudi Arabia in 1982, and in Casablanca, Morocco in 1983 respectively.

v) Setting up, within the Secretariat of the Corporation, an Investment and Project Promotion Unit which has successfully promoted a number of specific projects.

UNIDO has maintained close contacts with the IAIGC ever since it started its operations, and the benefits of UNIDO's experience in industrial projects promotion were always at the disposal of the IAIGC. Senior officials from both organizations regularly exchange operational visits. Representatives of the IAIGC attended several UNIDO Investment Promotion Meetings organized for the benefit of Arab countries, and UNIDO staff members participated as lecturers cum resource persons in the four training seminars which were organized by the IAIGC in Sana'a (1982), Morocco (1983), Aden and Mogadisco (1984). These seminars cover a variety of topics related to Arab and international financial markets, sources of project finance, and ways of improving the investment climate in Arab countries.

The Arab Fund for Economic and Social Development (AFESD)

In 1975 AFESD established an Investment Promotion Unit within its Headquarters Secretariat with the objective of identifying, preparing and promoting feasible investment projects suitable for Arab private investment. UNIDO experts participated in the work of this Unit which was not as successful as had been hoped. The reason for this is attributed to the statutory provision which does not permit AFESD to participate in the equity of investment projects, a factor which is considered essential for the promotion of private sector investments.

The Gulf Organization for Industrial Consulting (GOIC)

UNIDO played a very active role in promoting the establishment of GOIC whose objectives have an important industrial projects promotion component, especially for "common" or joint Arab projects. Co-operation between UNIDO and GOIC is continuing in various fields, and recently discussions were undertaken at the highest levels from both organizations for the specific purpose of intensifying co-operation in the promotion of industrial projects, especially small and medium size industries in the Arab countries of the Gulf. It is hoped that these discussions will soon bear fruit.

Annex No.1

How To Start Manufacturing Industries

TROPICAL FRUIT NECTAR PROCESSING PLANT

Developing countries are generally located in tropical climates, and therefore have many different varieties of tropical fruits which if processed, can result in delicious fruit nectars. Some examples are: Banana, Papaya, Guava, Cashew and Mango.

Tropical fruits are very expensive and very popular in developed nations due to their exotic flavors. It is very difficult for developing countries to export fresh fruits, as they are delicate and sensitive to handling and also because of the technology required in growing, harvesting, transporting, packing, ripening, etc. By transforming fruit into pulp or nectar, its external appearance is no longer important. When dealing with very sofisticated markets, fruits with any kind of flaws are rejected. Whereas, when producing nectar,only the edible part of the fruit is important. This means that even though a fruit has some kind of damage, its flavor, texture, appearance, and color may be perfect for the production of pulp or nectar.

The production of tropical fruit nectar presents a very high yield because the pulp is diluted with an acidified syrup usually in a proportion 1:1.

Pelling of the fruit is usually done manually, and therefore requires many workers. One of the characteristics of developing countries is the availability of cheap, unskilled labor. The following factors: a) availability of raw material of good quality for pulp production; b) existence of cheap labor; c) availability of cheap arable land; and d) proximity to sea ports, all contribute to the sucess of this kind of industry. The main advantage, however, is the fact that developed nations can never compete, as they cannot economically produce tropical fruits.

The equipment used in the production of fruit pulp is very simple, requires little maintenance and consumes little electricity and fuel. In this kind of industry

the equipments can operate all year round at full capacity due to the variety of fruits that can be processed and are harvested at different times of the year. This also means that the factory workers may be hired on a permanent basis.

The existence of foreign distributors and good marketing are key factors for the success of the investment.

PROCESS DESCRIPTION

The process here described is based on a continuous supply of raw material (tropical fruits) during the year. This is possible as there is no significant change of weather between seasons in tropical climates. In these countries bananas are harvested several months in the year, the same being true with papaya. Cashew, guava and mangos, are usually harvested during a period of two months, at different times of the year.

1. Reception and Ripening

This industry can work with natural fruit or with the pulp, already extracted and preserved. Fruit can be classified as: (a) climacteric; and, (b) non climacteric.

Ripening

When fruit is used as raw material, ripeness is an important factor. Banana, Papaya, and mango need to be ripened after harvesting, while cashew and guava are picked when ripe. The first group; banana, papaya, and mango, should therefore be kept in a ripening room with controlled atmosphere. In this room gas can be injected to accelerate the ripening process and the heat produced during the respiration process of the fruit can be removed. Controlled ripening is important in order to develop good flavor and to have uniformity of raw material, with all fruits ripening at the same time.

2. Washing and Selection

Ripe fruits are washed with chlorinated water (5 to 10 ppm) first by soaking and then by jet spraying.

The washed fruits are then selected. Here, all damaged,roten,over ripe, and green fruits are rejected.

3. Peeling and Seed Removal

Fruits are peeled manually using a stainless steel knife and are transported on a sanitary rubber belt conveyor. A knife is also used to separate most of the pulp from the seed, but a pulper is necessary to remove the seed completely.

4. Pulp Separation

The first pulping mill has an openning of 0.033" while the second one has an opening of 0.020". The pulp after passing through these mills is very homogenous and thin. In this operation all undesirable fibers are removed, as well as the stone cells.

5. Formulation

The homogenized pulp is then pumped to formulation tanks where sugar (sucrose), water, and citric acid are added. Cashew and guava have a high Vitamin C content, but banana, mango, and papaya have only a small content of ascorbic acid. In this case, an antioxidant must be added in order to avoid oxidation, which alters the flavor and the color of the product. As already pointed out,the usual ratio of acidified syrup to the fruit pulp is 1:1.

The ^{o}Brix/Acid ratio of the nectars is normally in the range of 18 to 20, but this depends on the consumer's preference. The final formula of the product should be developed according to the consumer taste preference. The final pH should always be under 4.0.

6. Sterilization

Formulated nectars are continuously sterilized at 95°C using a plate heat exchanger. This heat exchanger has other stages where the nectar is aseptically cooled under pressure.

When the containers used are glass bottles, the minimun filling temperature of the nectar is 85°C, and after filling, these bottles are immediately closed by crown corks.

Sterilized containers such as "Tetra Brik" type can also be used. On this case the plate heat exchanger aseptically cools the nectar and aseptically fills the sterilized containers.

7. Cooling

If glass containers are used, the cooling process must be carried out in water baths at 70°C, 50°C and at room temperature. Cooling must be gradual to avoid glass breakage due to thermal shock.

Aseptically filled containers require no cooling because the nectar is at room temperature at this stage.

8. Storage and Distribution

Fruit nectar is packed in wooden boxes or cartons which hold approximately 24 bottles or 30 "Tetra Brik" containers. It is distributed and stored at room temperature, having a shelf life of one year, if not exposed to sun light.

EXAMPLE OF A TROPICAL FRUIT NECTAR PROCESSING PLANT

The production capacity of this plant is of 720,000 liters/ month operating 8 hours/day, 25 days/month and 300 days/year.

The following equipments are necessary:

a. Universal Fruit Washer

b. Sanitary Belt Conveyors

c. Pumps

d. Desintegrator

e. Pulpers

f. Tank with Agitators

g. Plate Heat Exchanger

h. Fillers

i. Coolers

When aseptically filled containers are used items (g), (h), and (i) are substituted by:

- aseptic plate heat exchanger; and,

- aseptic filler

In the first case, an estimate of the FOB price of the equipment is US$ 300,000. If aseptic filling is used the investment required is practicaly doubled and the FOB price of the equipment is approximately US$ 600,000.

Tables 1, 2, 3 and 4 give an idea of the amount of raw material, utilities, manpower and area required in this specific case.

PROCESS FLOW SHEET FOR TROPICAL FRUIT NECTAR INDUSTRIAL PLANT

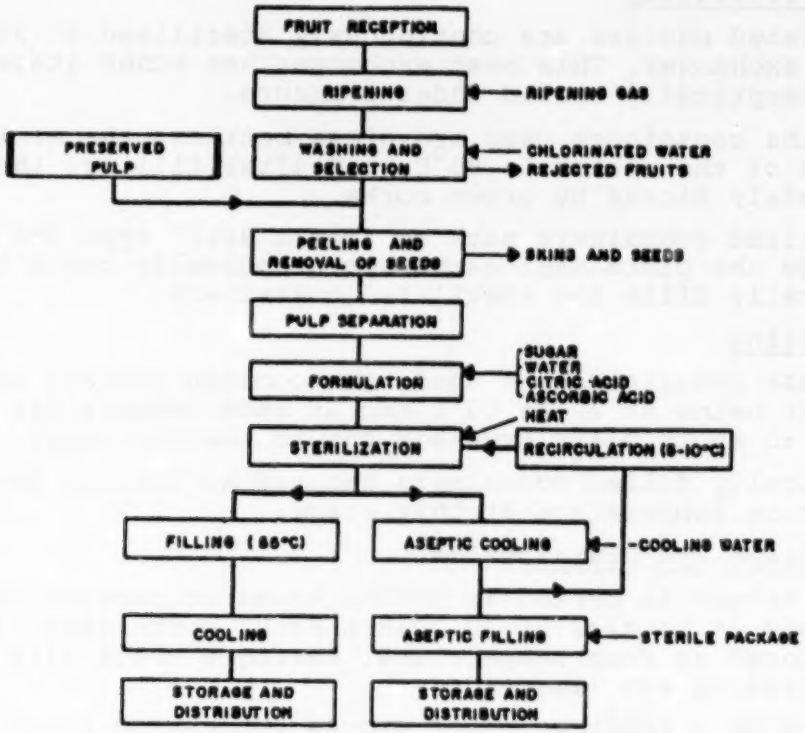


TABLE 1.

MONTHLY REQUIREMENT OF RAW AND SUBSIDIARY MATERIALS

ITEM	QUANTITY
BANANA	2,000 TONS
CASHEW	1,000 TONS (2 MONTHS)
MANGO	1,000 TONS (2 MONTHS)
GUAVA	1,000 TONS (2 MONTHS)
PAPAYA	1,000 TONS
PRESERVED FRUIT PULPS	1,500 TONS
SUGAR	900 TONS
CITRIC ACID	7.5 TONS
ASCORBIC ACID	0.3 TONS
BOTTLES OR "TETRA BRIK" PACKAGE	30,000 THOUSAND 15,000 THOUSAND

TABLE 2.

UTILITIES REQUIRED PER 1,000 LITRES

ITEM	QUANTITY / 1,000 L
ELECTRICITY	10 KW
STEAM	180 KG
PROCESS WATER	10 M3
FUEL	14 KG
REFRIGERANT	0.1 KG
RIPENING GAS	0.1 KG

TABLE 3.

REQUIRED MANPOWER

ITEM	NUMBER
MANAGER	1
FOOD ENGINEER	1
SKILLED WORKERS	5
UNSKILLED WORKERS	50
MAINTENANCE	3
TOTAL	60

TABLE 4.

REQUIRED AREA FOR PLANT SITE

ITEM	AREA
BUILDINGS PROCESS PLANT, WAREHOUSE, LABORATORY, WORKSHOP, RIPENING ROOM, ETC)	1,500 M2
LAND	5,000 M2

FILE: O3
ISIC 3819

How To Start Manufacturing Industries

Canning Plant

Preservation of foodstuffs has been conceived as an art of living ever since the dawn of human history. At present, various methods of preserving food can be cited, such as canning, refrigeration, drying, salt-pickling, sugar-preservation and smoking. However, from the viewpoint of preservation, transportation, sanitation and economy, canned food can be said to be the most ideal as compared with food prepared by other methods.

The canner is defined as a person who manufacures canned food for sale. In actuality, however, canners do not manufacture the food contents of cans nor do they sell the containers. What they produce is quite different from food which is merely put into cans. In other words, they incorporate the contents with the can by a special process to produce merchandise known as canned food, which is different from the mere food contents or the containers.

Manufactured goods represent a special function created by a new combination. What is sold as canned goods is nothing but the result of the function.

The main features of canned merchandise are: (1) ability to withstand long term preservation and transportation; (2) simplification and sanitation of cookery and (3) processing feasibility (canning adds to the taste of food, i.e., fruits, syrup-preserves).

In laying down the conditions for determining the scale of the plant, the following points should be taken into consideration.

(1) Whether the product is suitable for mass production from the technical viewpoint.

(2) Whether the purchase of the same or similar product can be carried out continuously and in a large quantity.

(3) Whether the sale of the same or similar product can be realized continuously and in a large quantity.

General Process

The canning process begins with the filling of food into a tin-can followed by the seaming of these containers, and the final process of sterilization under heat. In other words, seaming is done to prevent air-flow between the outside and the inside of the can, thus preventing bacteria from getting into the can. Whereas, sterilization under heat is designed to decimate any bacteria inside the can, thus repressing the action of bacteria in and out of the can, which causes decomposition of canned food. In the case of canning, air exhaust is a normal process interposing between the seaming and sterilization processes. In the case of bottling by machines, exhaust, heating and sterilization operations are done separately, while simplified bottling adopts, in normal cases, a single heating method in which air exhaust and sterilization are done at the same time. It is to say that the main process in canning and bottling can be summarized in the three processes of exhaust, seaming and sterilization.

The manufacturing process of canning is uniform except for some difference in the cooking process resulting from the kind of raw materials used.

Raw Materials

In manufacturing canned food, a wrong selection of raw materials may affect the final product, no matter how carefully the subsequent process is executed. In using marine food, it is necessary to judge the degree of freshness when processing because of the easy deterioration of the material.

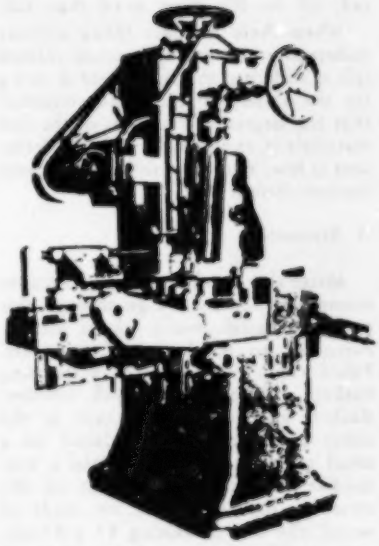
To cope with this, various physico-chemical studies have been conducted, such as refractive index measurement of the fixed quantity of decomposed product of meat albumen or eye-bal liquid.

With regard to agricultural raw materials such as fruits and vegetables materials of proper maturity must be used as they are indispensable for processing.

Example of Canning Plant

There are numerous kinds of canned foods, such as sea-food, fruits, vegetables, live stock products, soups and others. However, an example plant with a daily output capacity of 450 cans of boiled sardine (No. 4 can x 4 dozen) is taken up in view of the raw material collection situation.

The first factor which must be taken into consideration in the installation of a plant, is the collection of raw materials, and in particular, whether a supply of identical or similar types of fish can be obtained. It goes without saying



Vacuum seamer

that the supply and purchase of empty cans at a distant location is uneconomical in regard to freightage. In the case of a cannery, a plant having a production capacity of 450 cases per day falls in the medium and small-scale category.

Process Description

1. Adjustment of Materials

1) Cooking

Cut off the fish-head and pectoral fin along the dirsiventral line diagonally with a small carver, and take out the bowels gently so as not to tear off the bowel tip. Cut the fish from into 9–10 cm length for the No. 4 can, 8 cm for the small No. 1 can, 11–14 cm for the oval can starting from the neck.

2) Washing

After cooking, the fish is washed to remove blood and scales. Washing is done by water chute or a tank.

3) Salting

The fish is then drained, and soaked into salt water of B 18 . Fatty fish of 90 g in weight are soaked for about 25 min., while thin fish must be taken out of the water in good time. Salting has the effect of giving fish a salty taste, strengthening the skin, removing blood, and preventing the growth of curd in the product. After having been salted, the fish undergoes rough washing with plain water or weak salt water.

2. Filling

Prior to filling, the fish is weighed. When filling half-cut fish as in the case of the small No. 1 can, it is desirable to put in an equal quantity of head and tail, or to fill more head than tail.

When there is direct filling without undergoing the salting process, refined salt is added to the amount of 2–2.5 g for the small No. 1 can, on condition that the degree of freshness of the raw materials is exceedingly high. If freshness is low, salt water will tend to cause contamination.

3. Steaming

Materials seamed by a vacuum seamer do not usually go through this process, though many plants are accustomed to employing this process. Filled can are arranged in a steaming basket with an open work bottom. Baskets are piled one on top of the other in several layers, placed on a small rack, and then sent into a tunnel-like exhaust box. Most of the steaming baskets in use are made of wood, the size measuring 47 x 47 cm, and capable of accomodating 36 No. 4 cans or 725 small No. 1 cans. It is preferred that the edge of the steaming basket has a height about 1 cm higher than that of an oval No. 1 can.

4. Seaming

Before seaming, each can must be weighed in order to prevent shortage of weight.

After seaming, the cans are fed into a jet-spraying can washer for cleansing with a neutral cleanser. Then they are rinsed with plain water to be transferred to a basket type retort.

5. Sterilization

Seamed cans undergo sterilization immediately. Unsteamed cans must not be left untouched for long, because the quality of the product will deteriorate.

Sterilized fish is cooled in the water, and is filled in a clean-wiped can.

Table 1: Standard of Canning Boiled Sardine

Can type	Sardine weight (g)	Gross weight (g)
No. 4	350	425
Small 1	125	155
Oval 1	320	425
Oval 3	150	215

Required Amount of Raw Material

The required amount of raw material varies according to the size of the fish and the dehydration amount. The standard amount is as shown in Table 2.

Locational Condition

The cannery plant is usually built where raw material is produced. In any case, the site must have the condition of availability, in necessary amounts, of a cheap supply of high quality raw materials in terms of both freshness and maturity. However, as compared with perishable foods, canned-food products can be easily preserved and transported.

Factors constituting locational conditions can be roughly divided into natural, economic and other factors.

The total requirement of the plant site area is 4,180 m^2 including 1,913 m^2 of floor area.

Table 2: Required Amount of Raw Material

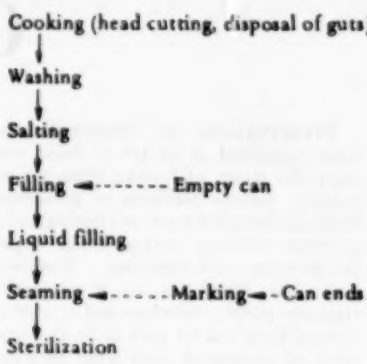
Can type	Raw material (kg)	Table salt (kg)
4 doz. of No. 4	30 – 32	0.3
100 cans of small No. 1	24 – 26	0.15
4 doz. of oval No. 1	30 – 32	0.3
4 doz. of oval No. 2	15 – 16	0.15

Table 3: Required Machinery and Equipment

Item	
Nobbing & cutting machine	1
Washing tank	4
Salt soaking tank	4
Empty can conveyor	2
Packaging conveyor	1
Table for balance	2
Tray	300
Can assembling table	1
Cooking box (steamer)	1
Drainer	2
Can supplying table	2
Model MF-6M rotary filler	1
Model N53 rotary filler	1
Model 5 MA vacuum seamer	1
Model M18A vacuum seamer	1
Type 5P vacuum pump	1
Type 6P vacuum pump	1
Model 3 can washer	1
Chain hoist with trolley rail	1
Clutch door type horizontal retort	5
Basket cooler	40
Jacketted steam kettle	3
Stainless tank	2
Gear pump	1
Model H marker	1
Balance	15
Seaming micrometer	2
Seaming wire gauge	2
Seaming scale	2
Seam bank saw frame	2
Seam bank saw	10
Vacuum can tester	2
Hand can tester	2
Saccharimeter	2
Inspection bar	2
Tell-tail thermometer	10
Salinometer	2
Boiler	1

FOB price of machinery and equipment (approx.) $US 476,000

Process Flow Sheet for Canning Plant



Raw Materials and Utilities

Raw material fish should be delivered to the plant whenever they are used. When they must be stored, they are put into a freezer. It is desirable that the empty cans to be used should be supplied at the desired time. If they are not, however, it is desirable to maintain a close contact with the can making factory so that cans may be delivered on the previous day for storage in the cannery plant. Required amount of raw materials and utilities is shown in Table 4.

Table 4: Daily Requirement of Raw Materials and Utilities

Item	Quantity
Materials	
Sardine	15 tons
Table salt	500 kg
Empty can (No. 4)	450 c/s
Utilities	
Electric power	75 kWh
Fuel (C standard)	200 ℓ/hr.
Water	150 tons

Table 5. Required Manpower

Item	No.
Technician	3
Male worker	25
Female worker	80
Senior clerical worker	1
Assistant clerical worker	2
Total	111

Annex 2

UNIDO INVESTMENT PROMOTION INFORMATION SYSTEM (INPRIS) - PROJECT FILE

CONTROL NUMBER: 001929
ISIC: 3811, 3822
PROJECT NUMBER: SOM/033/V/84-11 COUNTRY: Somalia
PROJECT TITLE: Agricultural Implements and Hand Tools
PRODUCT & CAPACITY: Animal-drawn implements (cultivators, planters, ridgers, etc.): 1,500/year
Tractor-drawn implements (ploughs, multi-purpose tools, ditchers, ridgers): 1,800/year
Spades, hoes, axes, pick axes, forks and levellers: 1,000 each/year
COOPERATION SOUGHT: LNS, SOT, TRX
TOTAL PROJECT COST: US$ 1,700,000 PROJECT IS: New
STUDY AVAILABLE: No LOCAL SPONSOR: Yes
PROJECT STATUS: Active AS ON (DATE): 850220

UNIDO INVESTMENT PROMOTION INFORMATION SYSTEM (INPRIS) - INVESTOR FILE

CONTROL NO.: 002586

ISIC MAIN PRODUCTS
3692 Portland cement, off-white cement, lime, cement clinker

CODE NUMBER: AUL047
NAME OF FIRM: Adelaide Brighton Cement Ltd.
ADDRESS: Charles St.
Birkenhead
South Australia 5015
Australia
TELEPHONE: (08) 48 0400 TELEX: AA82789
CONTACT NAME: Mr. G.A. Fry POSITION: Director, Admin.
PREF DEV CNY: PCF, RAS
DATE: 840118

UNIDO INVESTMENT PROMOTION INFORMATION SYSTEM (INPRIS) - BANK FILE

CONTROL NO.: 000010
CODE NUMBER: QAR020 COUNTRY: Kuwait
NAME OF INSTITUTION:
The Industrial Bank of Kuwait
ADDRESS: P.O. Box 3146
Safat
Kuwait
TELEPHONE: 2457861 TELEX: 22469, 22582
CABLE ADDRESS: BANKSENAEY- KUWAIT
CONTACT NAME: Mohamed Jamal TITLE: Executive Manager, Project Dept.
Lucien Toutounji Sen. Exec. Manager, Project Dept.

GEOGRAPHICAL COVERAGE: GUL
PAID-IN CAPITAL: KD20,000,000
RESERVES: KD8,848,001
LENDING LIMIT: MAXIMUM 20% of IBK's net worth and long-term loans
MINIMUM KD50,000
MATURITY RANGE OF LOANS: 4-8 years
FINANCING AVAILABLE FOR
STUDY OR PREPARATION OF PROJECTS: YES
EQUITY INVESTMENT IN PROJECTS: YES
PROJECTS IN PRIVATE SECTOR: YES
EXPORT CREDITS: NO
DATE: 840808

UNIDO INVESTMENT PROMOTION INFORMATION SYSTEM (INPRIS) - INSTITUTION FILE

CONTROL NO.: 000409
CODE NUMBER: MAL005
NAME OF INSTITUTION:
Malaysian Industrial
Development Authority
MAIL ADDRESS: P.O. Box 10618
Kuala Lumpur
Malaysia
TOWN ADDRESS: 3rd-8th Floor
Wisma Damansara
TITLE OF CEO: Director General
CONTACT NAME: J. Jegathesan TITLE: Director of Investment Promotion
TELEPHONE: 03-943833 TELEX: MIDA MA 30752
CABLE: MIDAMAL - Malaysia TYPE: PRM
DATE: 841120

UNIDO INVESTMENT PROMOTION INFORMATION SYSTEM (INPRIS) - SPONSOR FILE

CONTROL NO.: 000318
CODE NUMBER: BRA005
NAME OF COMPANY: Prolat Produtos Lacteos Ltda.
ADDRESS: Rua Carmo Gifone
441-38400 Uberlandia
Brazil
TELEPHONE: (034) 238-1224 TELEX: (034) 3243 CSOR BR
CABLE ADDRESS: ...
CONTACT NAME: Jayme Tannus

ISIC DESCRIPTION
3112 Dairy products

REFERENCE: BRA/001/V/84-05
DATE: 840709

Annex No. 3

UNITED NATIONS NATIONS UNIES

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Telex: 59 703 unido ch

Annex No. 4

Industrial Investment Projects Reported as Concluded by the UNIDO Investment Promotion Services 1980 - 1984

Country	Title	Total Inv. cost $US million	Service
Algeria	Locksmithery (building hardware)	3.5	Cologne 1981
Egypt	Reinforced concrete pipes	5.5	Brussels 1980
	Vaccine production	1.5	Cologne 1980
	Frozen food processing	1.75	New York 1981
	Glass containers for pharmaceutials	46.0	Brussels 1981
	Meat processing	20.6	Vienna 1981
	Tomato growing project	16.0	New York 1981
	Meat-processing	4.0	Vienna 1982
	Production of sanitary irrigation material	10.5	Cologne 1984
	Paper sack factory	9.0	Zurich 1984
Iraq	Data Processing	6.0	Zurich 1980
	Vaccine production	4.6	Cologne 1981
Jordan	Cold store	0.24	Paris 1983
	Industrial bakery	2.4	Paris 1983
Mauritania	Fish processing	69.0	Cologne 1981
Morocco	Chemical plant	1.0	New York 1980
	Distribution and copying equipment recycling plant	4.0	New York 1980
	Repair Shops	2.5	Zurich 1980
	Seaweed harvesting	0.8	New York 1981
	Biscuit factory	1.2	New York 1981
Morocco	Steel structures	n.a.	Zurich 1982
	Phosphates	0.4	Brussels 1983

Oman	Tyre retreading	1.9	Cologne 1980
Saudi Arabia	Manufacture of aluminium windows	1.8	Cologne 1982
United Arab Emirates (Ajman)	Oil recycling plant	3.5	Cologne 1981

Annex No. 5

UNIDO INVESTMENT PROMOTION SERVICES

On-the job orientation programme

Participants

1978 - 1985

Country	Participant	Duration	Service
Algeria	Mr Omar Aoudj	s/t 1982	Brussels
Egypt	Mr M.S. Bayoumi	s/t 1978	New York
	Mr Hassan Gadel Hak	s/t 1979	New York
	Mr A. A. El-Din Nazmy	s/t 1979	New York
	Mr Mohamed Balah	s/t 1981	New York
	Mr Mahmoud Mourad	s/t 1981	New York
	Mr Mohamed Sadek	s/t 1981	New York
Iraq	Mr Malik Adnan Nisaif	s/t 1979	Paris
	Mr Salah Al-Saicq	s/t 1979	New York
Jordan	Mr Mohamed Hamdalla Nsour	1983/84	Paris
Mauritania	Mr I Ould Sidi Ahmed Vall	s/t 1979	New York
	Mr Aly Demba Kamara	s/t 1983	Brussels
Morocco	Mr Mounir Bensaid	1978/81	New York
	Mr Oussama Rhissassi	s/t 1984	New York
	Mr Jilali Mouedden	s/t 1978	New York
	Mr. Otmane H. Sqali	s/t 1982	New York
Qatar	Mr Nasser Al-Khalifa	s/t1979	New York
Somalia	Mr A.A. Mohamed	1984/85	New York
Sudan	Mr Mubarak Abdel-Azim	s.t 1979	New York
	Mr Saeed Saad	s/t 1979	New York
	Mr Mamoun Medani	s/t 1979	New York
	Mr Farouk Zaki	s/t 1979	New York
	Mr Hasasan Ahmed	s/t 1981	New York
	Mr Mohamed Hamad	s/t 1981	New York
Tunisia	Mr Abderrahmane Krichene	s/t 1978	New York
	Mr Mohamed Chaieb	s/t 1978	New York
Yemen Arab Republic	Mr Omer Alkumeim	s/t 1978	New York

Annex No. 6

AN INDUSTRIAL SUBSECTORAL PROGRAMME APPROACH TO THE MOBILIZATION OF FINANCIAL RESOURCES THROUGH THE IDENTIFICATION AND PROMOTION* OF SPECIFIC INDUSTRIAL INVESTMENT OPPORTUNITIES AS WELL AS OF TECHNICAL ASSISTANCE AND PROGRAMME LENDING NEEDS

The Programme's features may be summarized as follows:

(1) It concentrates on a specific industrial subsector and a group of developing countries where the development of the subsector has been accorded priority and where small and medium-size industries predominate. An example of a subsector would be fruits and vegetables processing rather than food processing. This ensures that the programme activities lead to practical results.

(2) It enables developing countries to convert sectoral development plans into specific industrial investment opportunities (these may be for new, rehabilitation, expansion or redeployed projects), and to identify the technical assistance and programme lending needs to attain the objectives of these plans. The programme is implemented in several phases and provides as comprehensive as possible follow-up on each preceding phase, thereby enhancing the effectiveness of each phase.

(3) It provides an alternative and rational methodology for the generation of investment opportunities, instead of the currently prevailing practice of relying on machinery and equipment salesmen for this purpose;

(4) The programme brings together the industrialists themselves. These are the public or private industrialists, who are either already active in the selected subsector or are interested in entering it. The programme provides a forum for bringing industrialists from an industrialized or more advanced developing country together with their counterparts from a group of participating developing countries. This further

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* The term "promotion" in the context of this programme does not mean promoting an investment decision regarding any specific industrial project, but rather promoting an early and serious preliminary interest in pursuing a project further by one or more financing institutions, technical partner or joint venture partner, or others.

ensures the practical orientation of the programme;

(5) Involving the multidisciplinary and practical expertize of industrialists from developing and industrialized countries from the very early stages of investment projects generation replaces complete reliance on the expertize of UN consultants, ensures the generation of more serious projects, and enables potential "technical partners" to be involved in projects design from the early stages.

(6) Co-operation between these industrialists is to be brought about through:

(a) The preparation of a supporting set of background documentation by UNIDO for the purpose of facilitating the collection of realistic and up-to-date investment-oriented information, including problem areas, from the developing countries (the country paper), enabling them to begin to identify investment opportunities (investment projects questionnaire and plants profiles);

(b) The full involvement of qualified national teams, drawn from national organizations, such as development finance, R&D and investment promotion organizations, in the implementation of all phases of the programme and specifically in the preparation of the investment-oriented and diagnostic country paper on the subsector and of specific investment projects. If required, UN experts may assist the national teams in this task;

(c) Sending the documentation prepared by the national teams (country paper, investment projects, and technical assistance and programme lending needs) to participating industrialists from industrialized or more advanced developing countries, as well as to concerned national, regional and international financing institutions;

(d) The timely holding of a national workshop/investors forum in each participating developing country for the

purpose of seeking a national consensus on the findings of the country paper, how the subsector should be developed, government policy changes required, technical assistance and programme lending needs, etc. Industrialists from the industrialized or more advanced developing countries will be invited to attend this workshop;

(e) Arranging for the national teams and interested industrialists from participating developing countries to travel to the participating industrialized or more advanced developing countries in order to discuss, individually, specific investment and technical assistance projects, modify some and possibly generate new ones. These direct contacts can continue to benefit both parties long after the UNIDO programme comes to an end.

(7) Implementation of the programme is a practical demonstration of how a specific subsector can be developed in practical terms - i.e., it is a training by doing programme;

(8) The programme seeks to involve financing institutions by keeping them informed of the programme's progress with a view to ensuring that the outputs of the programme are suitable inputs for these institutions' financing activities (project financing, programme lending, lines of credit, etc.).

(9) Participating developing countries share in financing the implementation of the programme by paying 50% of the cost of travel to the industrialized country and by an in kind contribution in the form of time spent by the national teams on the programme.